



कार्यालयीनप्रयोगहेतु/For official use only
विवृतफाईलप्रतिवेदन/Open file report

भारतसरकार
Government of India
भारतीय भूवैज्ञानिक सर्वेक्षण
Geological Survey of India

टोपोशीट सं. 48ओ/1, 48ओ/5 एवं 48एन/8 के कतिपय भागों में माध्य पैमाने (1:50,000) पर
कर्नाटक के शिमोगा तथा चिकमगलूर जिलों के भूस्खलन सुग्राहिता मानचित्रण

**MACRO-SCALE (1:50,000) LANDSLIDE SUSCEPTIBILITY MAPPING IN PARTS
OF TOPOSHEET NOS. 48O/1, 48O/5 AND 48N/8 SHIMOGA AND CHIKMAGALUR
DISTRICTS, KARNATAKA**

मद सं. एम 4 एल एस एस एल / एन सी /एसआर/एसयू-केजी/2019/25180

Item no.: M4LSSM/NC/SR/SU-KG/2019/25180

कार्य सत्र: 2019-20/Field Season 2019-20

द्वारा/By

रस्या रघु, वरिष्ठ भूवैज्ञानिक/Resya Reghu, Senior Geologist
सेंतिलकुमार. के, भूवैज्ञानिक/Senthilkumar.K, Geologist

मिशन/MISSION-IV

परियोजना: एनएलएसएम /PROJECT: NLSM

राज्य इकाई: कर्नाटक एवं गोवा /STATE UNIT: KARNATAKA & GOA

नवंबर, 2020 /November, 2020

महानिदेशक, भारतीय भूवैज्ञानिक सर्वेक्षण, कोलकाता की पूर्वानुमति के बिना आंशिक या पूर्ण, किसी भी रूप में प्रकाशित नहीं किया जाना है
Not to be published in part or full without prior permission of the Director General, Geological Survey of India, Kolkata

भारतसरकार
Government of India
भारतीय भूवैज्ञानिक सर्वेक्षण
Geological Survey of India

टोपोशीट सं. 48ओ/1, 48ओ/5 एवं 48एन/8 के कतिपय भागों में माध्य पैमाने (1:50,000) पर
कर्नाटक के शिमोगा तथा चिकमगलूर जिलों के भूस्खलन सुग्राहिता मानचित्रण

**MACRO-SCALE (1:50,000) LANDSLIDE SUSCEPTIBILITY MAPPING IN PARTS
OF TOPOSHEET NOS. 48O/1, 48O/5 AND 48N/8 SHIMOGA AND CHIKMAGALUR
DISTRICTS, KARNATAKA**

मद सं. एम 4 एल एस एस एल / एन सी /एसआर/एसयू-केजी/2019/25180

Item no.: M4LSSM/NC/SR/SU-KG/2019/25180

कार्य सत्र: 2019-20/Field Season 2019-20

द्वारा/By

रस्या रघु, वरिष्ठ भूवैज्ञानिक/Resya Reghu, Senior Geologist
सेंतिलकुमार. के, भूवैज्ञानिक/Senthilkumar.K, Geologist

मिशन/MISSION-IV

परियोजना: एनएलएसएम /PROJECT: NLSM
राज्य इकाई: कर्नाटक एवं गोवा /STATE UNIT: KARNATAKA & GOA

नवंबर, 2020 /November, 2020

**MACRO-SCALE (1:50,000) LANDSLIDE SUSCEPTIBILITY MAPPING IN PARTS OF
TOPOSHEET NOS. 48O/1, 48O/5 AND 48N/8 SHIMOGA AND CHIKMAGALUR
DISTRICTS, KARNATAKA**

Item no.: M4LSSM/NC/SR/SU-KG/2019/25180

Field Season 2019-20

By

Resya Reghu, Senior Geologist

Senthilkumar. K, Geologist

CONTENTS

		Page no.
	सारांश	i-ii
	ABSTRACT	iii-iv
1	INTRODUCTION	1-13
	1.1 Background Information	1
	1.2 Study Area	1
	1.3 Present Work	2
	1.4 Physiography and Drainage	3
	1.5 Climate and Rainfall	5
	1.6 Soil Types	5
	1.7 General Geology	5
	1.8 Landuse and Land cover	9
	1.9 Geomorphology	9
	1.10 Data and Software used	9
	1.11 Methodology	10
	1.12 Rainfall data	12
	1.13 Acknowledgement	13
2	PREVIOUS WORK ON LANDSLIDE STUDIES	14-15
3.	LANDSLIDE INVENTORY	16-22
	3.1 General	16
	3.2 Data source	16
	3.3 Inventory mapping	16
	3.4 Spatial Distribution of Landslides	17
4	LANDSLIDE SUSCEPTIBILITY ANALYSIS	23-50
	4.1 Background	23
	4.2 Selection of preparatory factors	23
	4.3 Geo-factors Themes	24
	4.3.1 Slope Morphometry	24

	4.3.2 Landuse and Landcover	31
	4.3.3 Geomorphology	35
	4.3.4. Slope Forming Material (SFM)	39
	4.3.5. Regolith Thickness	43
	4.4 Landslide Susceptibility Analysis	47
5	LANDSLIDE SUSCEPTIBILITY MAP	51-54
6	CONCLUSIONS AND RECOMMENDATIONS	55-60

REFERENCES

LOCALITY INDEX

LIST OF PLATES

Plate 1.1 Location map of the study area TS no 48O/1, 48O/5 and 48N/8
Plate 1.2 Drainage map of the study area (TS no 48O/1, 48O/5 and 48N/8)
Plate 1.3 Geological map of the study area (TS no 48O/1, 48O/5 and 48N/8)
Plate 3.1 Landslide inventory map of the study area (TS no 48O/1, 48O/5 and 48N/8)
Plate 4.1 Slope map of the study area (TS no 48O/1, 48O/5 and 48N/8)
Plate 4.2 Curvature map of the study area (TS no 48O/1, 48O/5 and 48N/8)
Plate 4.3 Aspect map of the study area (TS no 48O/1, 48O/5 and 48N/8)
Plate 4.4 LULC map of the study area (TS no 48O/1, 48O/5 and 48N/8)
Plate 4.5 Geomorphological map of the study area (TS no 48O/1, 48O/5 and 48N/8)
Plate 4.6 Slope forming material map of the study area (TS no 48O/1, 48O/5 and 48N/8)
Plate 4.7 Regolith thickness map of the study area (TS no 48O/1, 48O/5 and 48N/8)
Plate 5.1 Susceptibility map of the study area (TS no 48O/1, 48O/5 and 48N/8)

LIST OF TABLES

Table 1.1 Nature and Quantum of work done
Table 1.2 Generalised Stratigraphic Succession
Table 2.1 Location details of the inventory landslides
Table 4.1 Slope angle ranking and LOFS
Table 4.2 Land use and Land cover classes with rating and LOFS values
Table 4.3 Geomorphology classes with rating and LOFS values
Table 4.4 Slope Forming Material classes with rating and LOFS values
Table 4.5 Regolith thickness classes with rating and LOFS values.
Table 4.6 Standard preference scale

LIST OF FIGURES

Fig 1.1 Macro scale (1:50000) Landslide susceptibility Mapping Methodology
Fig 1.2 Last ten years (2009-2019) rainfall pattern of Hosanagara Taluk
Fig 1.3 Month wise rainfall Jan to 8th Nov 2019
Fig 1.4 Day wise rainfall for the month of August.
Fig 4.1 Area percentage wise distribution of different slope angle categories

Fig 4.2 Slope angle Vs Landslide

Fig 4.3 Slope curvature percentage distribution

Fig 4.4 Area percentage wise distributions of various LULC categories

Fig 4.5 LULC Vs Landslide

Fig. 4.6 The area percentage wise distribution of various geomorphologic units

Fig 4.7 Geomorphology Vs Landslide

Fig. 4.8 SFM classes percentage distribution of the study area

Fig. 4.9 Regolith Thickness percentage distribution

Fig 4.10 Regolith thickness Vs Landslide

LIST OF ANNEXURES

Annexure-I Rainfall data of Hosanagara Taluk (2009- 8 th Nov 2019)

Annexure-II Landslide Inventory 42-point proforma

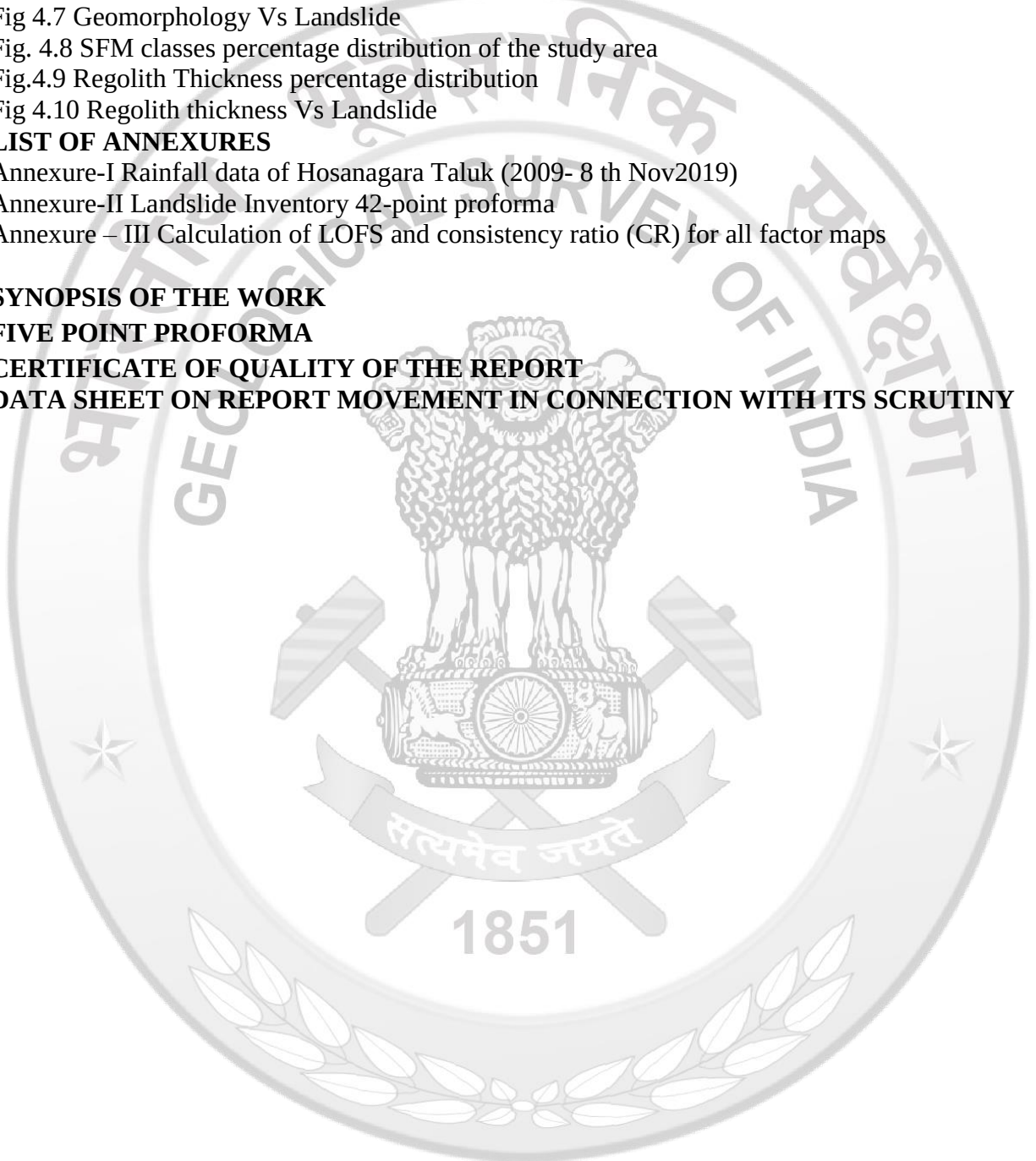
Annexure – III Calculation of LOFS and consistency ratio (CR) for all factor maps

SYNOPSIS OF THE WORK

FIVE POINT PROFORMA

CERTIFICATE OF QUALITY OF THE REPORT

DATA SHEET ON REPORT MOVEMENT IN CONNECTION WITH ITS SCRUTINY



**टोपोशीट सं. 48ओ/1, 48ओ/5 एवं 48एन/8 के कतिपय भागों में माध्य पैमाने (1:50,000) पर
कर्नाटक के शिमोगा तथा चिकमगलूर जिलों के भूस्खलन सुग्राहिता मानचित्रण**

मद सं. एम 4 एल एस एस एल / एन सी /एसआर/एसयू-केजी/2019/25180
कार्य सत्र: 2019-20

द्वारा
रस्या रघु, वरिष्ठ भूवैज्ञानिक
सेतिलकुमार. के, भूवैज्ञानिक

सारांश

टोपोशीट सं. 48ओ/1, 48ओ/5 तथा 48एन/8 में शिमोगा एवं चिकमगलूर जिलों के कतिपय भागों में 1622 वर्ग किलोमीटर क्षेत्र को कवर करते हुए 1:50,000 पैमाने पर भूस्खलन सुग्राहिता मानचित्रण किया गया। अध्ययन का मुख्य उद्देश्य उच्च रिज़ॉल्यूशन वाले सुदूर संवेदन आँकड़ों, पुरानी अभिलेखीय जानकारी एवं क्षेत्र आदानों का उपयोग करते हुए भूस्खलन तालिका डाटाबेस तैयार करना एवं भूस्खलन के भूघटकों के लिए त्रिविम डेटाबेस तैयार करना भी है। बहुकालिक गूगल एर्थ चित्रों एवं आर्क-जीआईएस का उपयोग करते हुए भूमि उपयोग/भूमि आच्छादन (एलयूएलसी), भूआकृति वैज्ञानिक, डेम डेरिवेटिव मानचित्र (ढलान, वक्रता, अभिमुखता तथा अपवाह-तंत्र), ढलान की गठन सामग्री (एसएफएम), रेगोलिथ स्थूलता मानचित्र, भूस्खलन तालिका मानचित्र, स्थान-निर्धारण मानचित्र एवं मार्ग मानचित्र जैसे सभी पूर्व-क्षेत्र विषयक आदान तैयार किए गए। क्षेत्र में सांदर्भिक/सुलभ स्थानों पर पूर्व-क्षेत्र विषयक मानचित्र पुष्टिकृत/परिवर्द्धित एवं अद्यतन किया गया तथा क्षेत्र की जाँच के पश्चात पुष्टिकृत/परिवर्द्धित किया गया।

क्षेत्र के मुख्य भूमि उपयोग/भूमि कवर पैटर्न मोटी वनस्पति है, जो 39.6% है, इसके बाद उच्च ऊँचाई वाले बागान, कृषि, मध्यम आकार के वनस्पति एवं विरल वनस्पति आते हैं। भूआकृति वैज्ञानिक रूप से क्षेत्र को पर्वत शिखर, सामान्य रूप से विच्छेदित ढाल, निम्न रूप से विच्छेदित ढाल, त्रिकोणिका वायुकृत जटिल शैल-समूह, कटक शिखर, तरंगित मैदान एवं घाटी मेड़ में विभाजित किया जा सकता है। क्षेत्र में प्रमुख भूआकृतिक निम्न रूप से विच्छेदित ढाल है, जो क्षेत्र के 29.51% है, जिसके बाद तरंगित मैदान है, जो 25.87% है एवं सामान्य रूप से विच्छेदित ढाल है, जो 21.77% है। ढाल गठन सामग्री मोटे तौर पर चट्टानों, स्व-स्थाने मृदा, ढीले ढाल मलबे एवं वाहित मृदा मिट्टी में विभाजित है। स्व-स्थाने मृदा क्षेत्र के मुख्य भाग-66.24% को कवर करता है। 0.5-5 मीटर व 5-10 मीटर की रेगोलिथ मोटाई वर्ग का वितरण क्षेत्र (33%) में लगभग समान है।

निर्धारित 42-सूत्री प्रारूप में कुल 144 भूस्खलन (मलबा प्रवाह-14, मलबा ढाल-75, मृदा ढाल-55 एवं चट्टान ढाल-1) रिकार्ड किए गए। भूस्खलन के मुख्य कारण मानवीय हस्तक्षेप है, जो मुख्यतया कृषि, बस्तियों एवं मार्ग के निर्माण के लिए ढाल परिवर्द्धन है। हालांकि, वन प्रदेशों में कुछ प्राकृतिक ढाल भी अभिनर्धारित किए गए हैं। क्षेत्र में भूस्खलन के गैर-समान त्रिविम वितरण के कारण, ढलान कोण, भूआभूज, भूआकृतिविज्ञान, ढागसा तथा रेगोलिथ मोटाई जैसे पांच भू-कारक विषयों के विश्लेषण के द्वारा भूस्खलन सुग्राहिता मानचित्र तैयार करने के लिए विश्लेषणात्मक पदानुक्रम प्रक्रिया (एएचपी) विधि अपनाई गई।

इस क्षेत्र में अभिनर्धारित अधिकांश ढलान फेलियर मार्गों के लिए व्यापक ढाल कटाव में सीमित हैं एवं कृषि से संबंधित हैं जहां ढाल गंभीर रूप से परिवर्द्धित किए गए हैं। इन ढालों के अलावा 2019 के मनसून के दौरान शुरू हुई प्राकृतिक ढालों में लगभग 14 अदद मलबे प्रवाह भूस्खलन रिकार्ड किए गए हैं। मनसून के दौरान भारी वर्षा (अगस्त 2019 का पखवाड़े के दौरान) सभी ढालों के मुख्य ट्रिगर घटक है।

अध्ययन क्षेत्र में सामान्य सुग्राही क्षेत्र (11.79%) एवं निम्न सुग्राही क्षेत्र (87.95%) की तुलना में उच्च सुग्राही क्षेत्र (0.25%) बहुत कम हैं। ये उच्च सुग्राही क्षेत्र अधिकतर मार्ग के भागों एवं पर्वत की श्रेणियों के स्थानीयकृत हिस्सों में ही सीमित हैं। इसी प्रकार, सामान्य सुग्राही ढालों के त्रिविम स्थानिक वितरण खड़ी ढालों तथा मार्ग कॉरिडोर के किनारों में हुए व्यापक कटाव से संबंधित हैं। इसके अलावा, टोपोशीट सं. 48ओ/5 के दक्षिण पूर्वी भाग में पहाड़ियों के खड़ी ढलानों में एवं टोपोशीट सं. 48 ओ/1 के पश्चिमी भाग में पहाड़ी में सामान्य सुग्राही ढाल प्रदेश भी देखे गए हैं। निम्न सुग्राही क्षेत्र का कारण मुख्यतया क्षेत्र के 90% भाग निम्न ढाल कोण 0-15 में आते हैं, जो न्यूनतम रेटिंग युक्त है, इसलिए भूस्खलन होने की अनुकूलता स्कोर न्यूनतम है। चूंकि अध्ययन क्षेत्र में माने गए सभी थीम में से सबसे अधिक इंटगर वज़न इस ढाल में है, निम्न रेटिंग वाले वर्गों का ढालों पर निम्न सुग्राहिता प्रभावित करने का अधिक प्रभाव है।

लगभग 70% भूस्खलन की घटनाएं <15 डिग्री ढलान श्रेणी में हो रही हैं एवं इसे निम्न सुग्राही क्षेत्र बनाती हैं जो स्पष्ट रूप से मानवजनित गतिविधि प्रभाव इंगित करती है। स्पष्टता निम्न ढलान कोण में भी मानवजनित गतिविधि द्वारा ढालों के पुनर्भरण ढाल की सुरक्षा के घटक के परिवर्द्धन से सीधे जुड़ी हुई है। इसलिए, विस्तृत क्षेत्र में अलग-थलग इलाकों में लोगों की इन गतिशील गतिविधियों के माध्यम से ढलान स्थिरता पर प्रभाव की अनुवीक्षा या व्यक्तिगत रूप से पूर्वानुमान करना मुश्किल है। हालांकि, संचार गलियारों के कुछ भागों के किनारे सुग्राही क्षेत्रों के आसपास लघुकरण उपायों पर विचार किए जाने की आवश्यकता है।

**MACRO-SCALE (1:50,000) LANDSLIDE SUSCEPTIBILITY MAPPING IN PARTS
OF TOPOSHEETS NOS. 48O/1, 48O/5 AND 48N/8 SHIMOGA AND
CHIKMAGALUR DISTRICTS, KARNATAKA**

Item no.: M4LSSM/NC/SR/SU-KG/2019/25180

Field Season 2019-20

By

**Resya Reghu, Senior Geologist
Senthilkumar. K, Geologist**

ABSTRACT

Landslide susceptibility mapping on 1:50,000 scale was carried out covering an area of 1622km² area in Toposheet nos. 48O/1, 48O/5 and 48N/8 in parts of Shimoga and Chikmagalur districts. The main aim of the study is to prepare the landslide inventory database using high resolution remote sensing data, archival information and field inputs and also the preparation of spatial database for geofactors of landslides. All the pre-field thematic inputs such as Land Use/Land Cover (LULC), Geomorphology, Dem derivative maps (slope, curvature, aspect and drainage), Slope Forming Material (SFM), Regolith thickness map, Landslide inventory map, location map and road map were prepared by using multitemporal Google earth images and Arc-GIS. The pre-field thematic map were validated, modified and updated at relevant/accessible locations in the field and validated/modified after the field check.

Major Land Use/Land Cover pattern of the area is thick vegetation (39.6%) followed by high height planatation, cultivation, moderate vegetation and sparse vegetation. Geomorphologically the area can be divided into hill-top, moderately dissected slope, lowly dissected slope, pediment pediplain complex, ridge-top, rolling plain and valley fill. Lowly dissected slope (29.51%) is the predominant geomorphic unit in the area followed by rolling plain (25.87%) and moderately dissected slope (21.77%). The slope forming material is broadly divided into rocks, insitu soil, loose slide debris and transported soil. Insitu soil covers the major part of the area (66.24%). The distribution of regolith thickness class of 0.5-5m and 5-10m is almost same in the area (33%).

A total of 144 landslides (Debris flow-14, Debris slide-75, Soil slide-55, and Rock slide-1) were recorded in prescribed 42-point format. The main cause for the landslides are human interference mainly slope modification for agriculture, settlement and construction of road.

However, few natural slides are also identified in forest areas. Due to the non-uniform spatial distribution of landslides in the area, Analytical Hierarchy Process (AHP) method was adopted to prepare the landslide susceptibility map by analyzing five geo-factor themes such as slope angle, LULC, Geomorphology, SFM and Regolith thickness.

The most of the slope failures identified in the area are confined to the extensive slope cut for roads and adjacent to the cultivation where slope is critically modified. Besides these slides, around 14 nos of debris flow landslides are recorded in the natural slopes which are initiated during the 2019 Monsoon. The heavy rainfall during monsoon (fortnight of August 2019) is the major triggering factor for all the slides.

The high susceptible area is very less (0.25%) all over the study area compared to moderately susceptible area (11.79%) and low susceptible area (87.95 %). These high susceptible areas are mostly confined to the localized stretches of road sections and hill ranges. Similarly, the spatial distribution of moderately susceptible slopes is found to be associated with steep slopes and extensive slope cuts along road corridors. In addition, moderately susceptible slopes areas are also observed along the steep slopes of hills in southeastern part toposheet no 48O/5 and the hillock in the western part of toposheet no 48O/1. The high percentage of low susceptible area is primarily because about 90% large area falling in low slope angle 0-15° which have minimum rating and therefore minimum Landslide Occurrence Favorability Score. And since the slope has the highest integer weight among all the themes considered in the study area, the low rated slope classes have higher influence to give low susceptibility to the slopes.

Nearly 70% landslide incidences are falling over <15° slope category and makes them low susceptible zone which clearly indicates that anthropogenic activity influence. Re-profiling of slopes by anthropogenic activity even in apparently low slope angle is directly linked to a modification of the factor of safety of the slope. Therefore, the influence on slope stability through these dynamic activities of the people in isolated pockets over large area is difficult to be monitored or predicted individually. However, mitigation measures around susceptible areas along a few stretches of communication corridors need to be considered.

1. INTRODUCTION

1.1 Background Information

Landslide is a natural phenomenon which is caused majority due to heavy rains, floods, earthquakes, construction etc. Many shallow landslides are triggered by heavy rainfall on hill slopes resulting in enormous casualties and huge economic losses in mountainous regions. Hill slope failure usually occurs as soil resistance deteriorates in the presence of the acting stress developed due to a number of reasons such as increased soil moisture content, change in land use causing slope instability, etc. Geological Survey of India, being the Nodal Agency for Landslides in India since 2004, vigorously and swiftly started integrated approach towards landslide hazard studies which included site specific landslide studies, landslide hazard zonation along road corridors and townships and preparation of landslide inventory.

Since FS 2014-15, GSI undertook a national programme on landslide susceptibility mapping – Macro scale (1:50,000) National Landslide Susceptibility Mapping (NLSM) with an aim to produce a seamless landslide susceptibility mapping database across the country. The main purpose of this national programme is to prepare a nation-wide landslide inventory and susceptibility database for easy retrieval, use and updation in future whenever new events and large-scale changes in geo-environmental parameters are encountered. All over India for mountainous region NLSM programme will be completed by 2020.

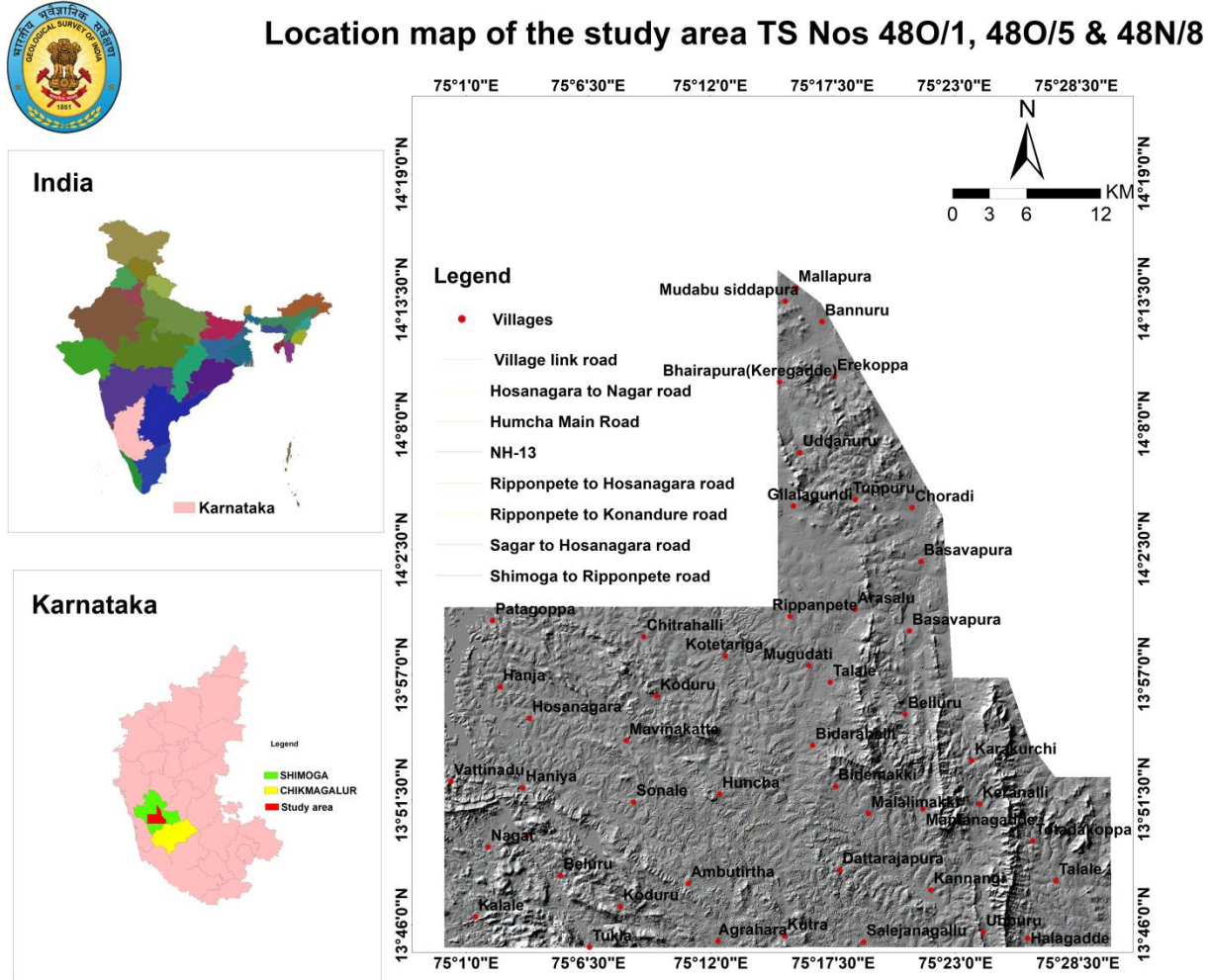
Landslide inventory was first carried out during FS 2007-08 in the states of Karnataka and Goa. Till the end of FS: 2018-19, about 26909 sq. km has been covered under NLSM programme covering Karnataka and Goa state. In SU: KG, seven NLSM items were taken up in FSP 2019-20. Among this one item vide FSP ID: M4LSSM/NC/SR/SU-KG/2019/25180 is in parts of Toposheet nos 48O/1, 48O/5 and 48N/8 Shimoga and Chikmangalur district. The objective of this item is i) Categorization of hill slopes in terms of landslide susceptibility, ii) Preparation of landslide inventory database using high resolution remote sensing data, archival information and field inputs and iii) Preparation of spatial database for geofactors of landslides.

1.2 Study Area

The study area is bounded by 13° 45'0" to 14° 30'0" N latitudes and 75° 0'0" to 75° 30'0" E longitudes (**Plate 1.1**). The area covers important localities such as Hosanagara, Nagar, Huncha, Kumsi, Harnahalli, Ayanuru, Hanigeri, Alase, Konanduru, Humachadakatte and Ripponpet. Main places are connected by weather metalled road and the interior places were

connected by foot/cart tracks. Part of the study area also covers some stretch of Southern Railway connecting Kumsi & Harnahalli with Shimoga town in the south east. Some stretch of NH-206 (Bangalore-Honavar road) and NH-13 (Shimoga-Thirthahalli road) also falls in part of the study area. Similarly, three state highways SH-1, SH-77 & SH-52 are passing through the area.

Plate 1.1



1.3 Present Work

It was proposed to cover about 1528 sq.km area in parts of Shimoga & Chikmagalur Districts, lying in Survey of India toposheets 48O/1, 48O/5 and 48N/8. The present work comprises pre-field map preparation, field work and post-field updating and finalization of maps. In pre-field work, different thematic layers were prepared and in field collection of land slide data along with updating of all pre-field maps were carried out. During field work in the

toposheet no.48O/5, some landslides observed out of boundary of the proposed area. So an area of 94 Sq. Km. extended in this toposheet as per order No:...../314/FSP Mod./P&M-4/2019-20 dated 13/1/2020. A total of 1622Sq. Km area was covered by landslide susceptibility mapping on 1: 50,000 scale (**Table 1.1**). After field work the collected data are updated and post-field maps prepared along with landslide susceptibility map.

Table 1.1 Nature and Quantum of work done

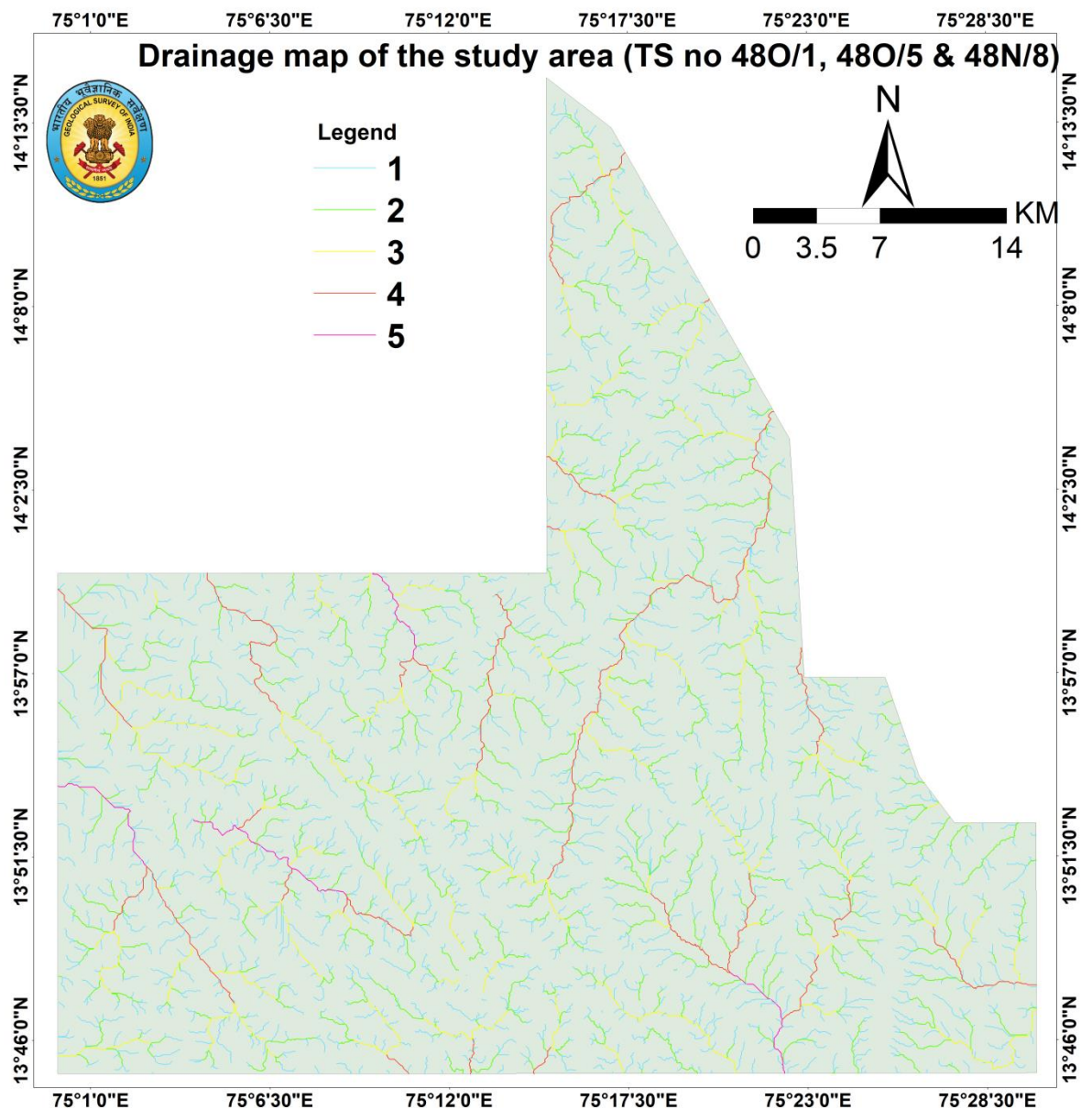
Nature of Work	Target F.S 2019-20 (sq.km)	Achievement F.S. 2019-20
1.Pre field map preparation		
i)Thematic maps (in GIS on scale 1:50000)		
a) Slope Forming Material map	1622	1622
b)Geomorphology & Lineament map	1622	1622
c)Slope Morphometry (slope, aspect & curvature) map	1622	1622
d)Landuse / Land cover map	1622	1622
e)Drainage map	1622	1622
f)Regolith depth map	1622	1622
ii)Landslide inventory map	1622	1622
2.Field based studies		
i)Field checking of all thematic maps	1622	1622
ii)Field checking and collection of landslide inventory attributes (41 point geo -parametric sheet)	1622	1622(144 Landslides)
3. Post field studies and modelling		
i)Updation of thematic and landslide inventory maps	1622	1622
ii)Landslide susceptibility modelling and finalization of landslide susceptibility map in GIS	1622	1622
4.Collection of rainfall data	Collected 10 year rainfall data for Shimoga District	

1.4 Physiography and Drainage

The area is a highly undulating terrain with low to moderately dissected hills, dense forests and valleys. The high hills and ridges are mostly linear N-S trending and represented by schists and iron ore bands, whereas lower plains occupied by gneisses. The prominent hillocks falling in the hill ranges of toposheet no 48O/5.

The area is drained by Sharavati River (North western part), Haridravati River (North western part), Kumudavati River (Northern part) and Tunga River (Eastern part) and other minor streams, which are tributaries of Tungabhadra River. Part of Hosadurga and Thirthahalli taluks are drained by tributaries of the Tunga River in the east. Some part of the study area is covered by Linganamakki Reservoir & Anjanapura Reservoir in western part and North eastern part respectively. The drainage pattern is sub-parallel and radial around ridges where as dendritic in gneissic country (**Plate 1.2**). In the study area, the streams are categorized into five orders.

Plate 1.2



1.5 Climate and Rainfall

Nearly 99% of the study area falling in Shimoga District. The climate in this district is tropical wet and dry (Köppen climate classification) summer average temperature 20–35 °C. This means that the winter and the early part of summer are typically dry periods. The majority of the rainfall occurs between June and early October. Yearly, the rainfall aggregates up to 3295mm of precipitation. January and February are the driest months, July the wettest, and April is the warmest month with an average high temperature of 35.5 degrees Celsius. Coldest months of Shimoga are July, August, November and December with average high temperature of 27 degrees Celsius. In summer (April–May), temperature crosses 36 °C at Shimoga (<https://en.wikipedia.org/wiki/Shimoga>).

1.6 Soil Types

In the study area, there are mainly two types of soils such as insitu soil and lateritic soil. The prominent rock type of the area is insitu soil due to the weathering of granite gneiss mainly in toposheet no.48O/1 and 48N/8. Lateritic soil observed in the gently undulating areas. The thickness of soil cover will vary from places to places. Generally, the thickness of the soil cover is 5-10m.

1.7 General Geology

The area exposes the rocks of Sargur Group, Peninsular Gneissic Complex, Bababudan Group and Chitradurga Group of Archaean age, acid and basic intrusives of Palaeoproterozoic age and laterite cappings of Cenozoic age.

Sargur Group is represented by quartzite, amphibolites and ultramafite. These rocks are seen as enclaves within the granite gneiss. Quartzite and ultramafite is exposed as a small enclave in the western and south western part of the area. Amphibolite is exposed as small as well as large enclaves in the west and north western part of the area.

The Peninsular Gneiss-I is represented by granite gneiss and granitoid. Granite gneiss covers the major part of the area. It is grey coloured, medium grained consists of quartz-feldspar and biotite, Granitoid is exposed as a small band in the southeastern part of the study area. The granitoid could have been emplaced during the first mountain building activity as evidenced by nature of contact and similar structural trends in both the units.

Bababudan (Western ghat) Group consists of metabasalt of Kudremukh Formation and Quartz-chlorite schist, Ferruginous phyllite, Garnet-grunerite schist and Banded magnetite

quartzite of Kodachadri Formation. These are exposed in the western part of the study area. Bababudan Group (Shimoga) is composed of Herambhapur Formation and consists of amphibolites and metabasalt with thin bands of quartzite and this formation is exposed as linear body in the east-central part of the area.

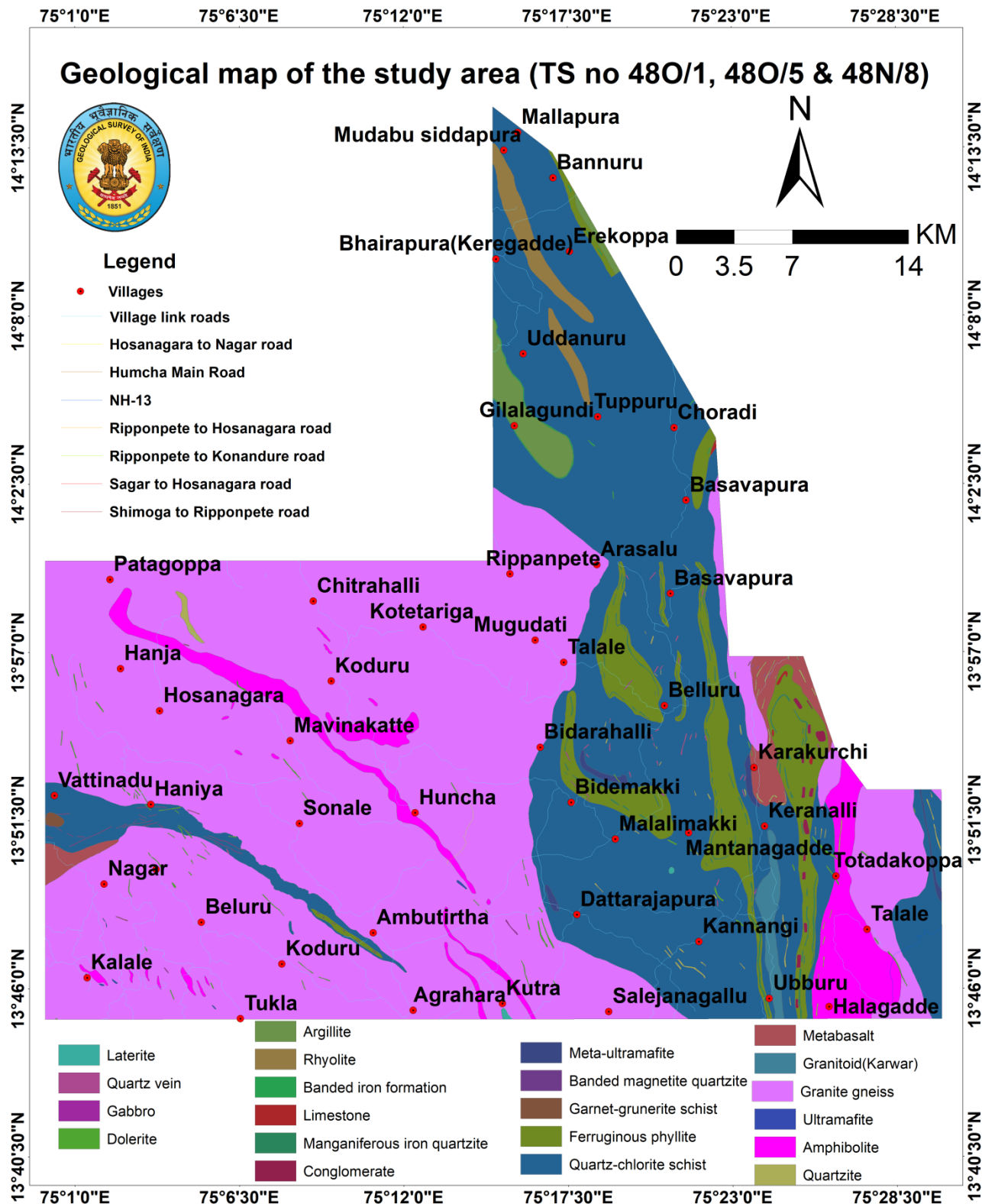
Chitradurga Group of rocks is represented by Jhandimatti Formation, Joldhal Formation, Medur and Ranibennur Formation. The Lower Jhandimatti Formation consists of quartz-chlorite schist, Quartzite and metaultramafite are present extensively in the eastern part and also in the southeastern and northern part of the area. Quartz-chlorite-schist is green to greenish black, schistose and consists of recrystallised quartz, chlorite, biotite, epidote, garnet and carbonate minerals. Joladhal Formation comprises ferruginous phyllite, limestone, BIF, thin band of polymict conglomerate and manganiferous iron quartzite. The lithounits belonging to this formation is seen exposed in the northern and eastern part of the area. Rhyolite is the rock type of Medur Formation and is exposed in the northern part of the area as linear bodies trending NW-SE. Argillite of Ranibennur Formation is exposed in the northern part. This lithounit occur as a large enclave within the schist belt. This rock is finely laminated and show development of slaty cleavage.

Several gabbro and dolerite dykes of variable length and width are seen cutting across the other lithounits. The rock is medium to dark green to greenish black, medium to coarse grained, hard and comprises pyroxene and plagioclase. Plagioclase laths are oriented in a criss-cross fashion within pyroxene groundmass. A few quartz veins having variable length and width are also present. Most of the veins are of white quartz while some are of blue quartz. They are in general conformable to the foliation in the host rock. Laterite occurs in the low-lying country as small patches. The geological map of the area is represented in **Plate 1.3**.

Table 1.2 Generalised Stratigraphic Succession

	FORMATION	GROUP	SUPERGROUP	AGE
Laterite				Cenozoic
Quartz vein	Acid intrusives	Younger intrusives		Palaeoproterozoic
Gabbro	Basic intrusives			
Dolerite				
Argillite	Ranibennur			
Rhyolite	Medur	Chitradurga (Shimoga)	Dharwar	Archaean
Banded Iron Formation	Joldal			
Limestone				
Ferruginous phyllite				
Manganiferous iron quartzite				
Conglomerate				
Metaultramafite	Jhandimati			
Quarzite				
Quartz-chlorite schist				
Quartzite	Herambhapur			
Metabasalt				
Amphibolite				
Banded magnetite quartzite	Kodachadri	Bababudan (Western ghat)		
Garnet-grunerite schist				
Ferruginous phyllite				
Quartz-chlorite schist				
Metabasalt				
Granitoid(Karwar)	Granitoids	Peninsular Gneiss-I	Peninsular Gneissic Complex	
Granite gneiss	Gneisses			
Ultramafite		Sargur		
Amphibolite				
Quartzite				

Plate 1.3



1.8 Landuse and Land cover

The terms land use and land cover are often used interchangeably, but each term has its own unique meaning. Land cover refers to the surface cover on the ground like vegetation, urban infrastructure, water, bare soil etc. Identification of land cover establishes the baseline information for activities like thematic mapping and change detection analysis. Land use refers to the purpose the land serves, for example, recreation, wildlife habitat, or agriculture. The concerns over land use/land cover (LULC) change have emerged on the global stage due to the realization that changes occurring on the land surface also influence climate, ecosystem and its services. As a result, the importance of accurate mapping of LULC and its changes over time is on the increase. Land Use & Land Cover map (**Plate 4.4**) is prepared in Arc GIS through visual interpretation in multitemporal Google Earth Imageries of the area. Roughly, the area in terms of LU/LC can be divided into following classes: Barren rocky slopes, settlements, plantations, sparse, moderate and thick vegetation; extensive cut slopes, cut slope settlement and river. The areas along river banks is covered with alluvial material and along low lying valleys is covered with overburden material and are being used for cultivation. Major part of the area is covered with moderate to thick vegetation. In the study area, the river banks are used for cultivation of High height plantations- arecanut and coconut along with paddy. Arecanut is the main plantation in these areas. The low lying hills are used for Cashew plantation and the high height plantation such as Acacia, Euclayptus, Nilgiris and Rubber.

1.9 Geomorphology

Geomorphology map is prepared in Arc GIS through visual interpretation of multitemporal Google Imageries of the area. NGLM data from CHQ was also taken into account while preparing the geomorphology map of the study area. In terms of Geomorphology, the area can be divided into ridges, moderately/low dissected slopes, Rolling plain and pediment-pediplain complex. Major part of the area represents Rolling plain and pediment-pediplain complex. The geomorphology map is represented in **Plate 4.5**

1.10 Data and Software used

- Data used: Topographic sheets and OSM sheets (open series) of SOI Toposheets no. 48O/1, 48O/5 and 48N/8

- Softcopy of Geology map on 1:50,000 scale (in jpg and shape file (.shp) format; Source: GSI, M&C Division).
- National Geomorphological and Lineament Map (NGLM data) on 1:50,000 scale (Source: GSI and NRSC).
- Software used: Arc GIS, Google Earth (Open source).
- Satellite Data used: Aster DEM (30 m resolution), Google Earth Satellite Imagery (multitemporal data).

1.11 Methodology

The terrain having scarce prior landslide information with very few natural landslide incidences and non-uniform spatial distribution, most of the documented landslides data indicate causal factor for landslide initiation as anthropogenic interference in modifying natural slope for development activities. Hence Analytical Hierarchy Process (AHP) based modeling is adopted to determine the landslide susceptibility of the study area. This is one of the methods of predictive mapping to arrive at qualitative landslide susceptibility as shown in Flow diagram **Fig 1.1**. In this method individual ratings for geofactor classes and weights of geofactors will be determined using Analytical Hierarchy Process (AHP) after preparing the pair wise qualitative comparison matrix of all factors (Saaty, 1977) after due discussion with local experts and workers. A mutually-agreed ranking in the scale of 0 to 9 is arrived at for each of the factor classes and themes through logical expert opinions and consensus. Accordingly, the Landslide Occurrence Favourability Score (LOFS) for each class of factor maps are generated. The class ratings and integer weights derived from AHP are used to obtain landslide susceptibility score map.

1.11.1. Pre-field thematic/geo-factor map preparations (in GIS on 1:50,000 scale)

As part of pre-field studies various thematic maps were prepared such as Slope, Curvature and Aspect (prepared from 30m resolution ASTER DEM); Geomorphology and Landuse/Landcover (prepared using Google Earth and ArcGIS base map 7 SPOT imagery) and Slope Forming Material and Regolith thickness (field based and GSI Geology map). In addition to these maps, Landslide Inventory Map also prepared using Google Earth imagery and field documentation of landslides.

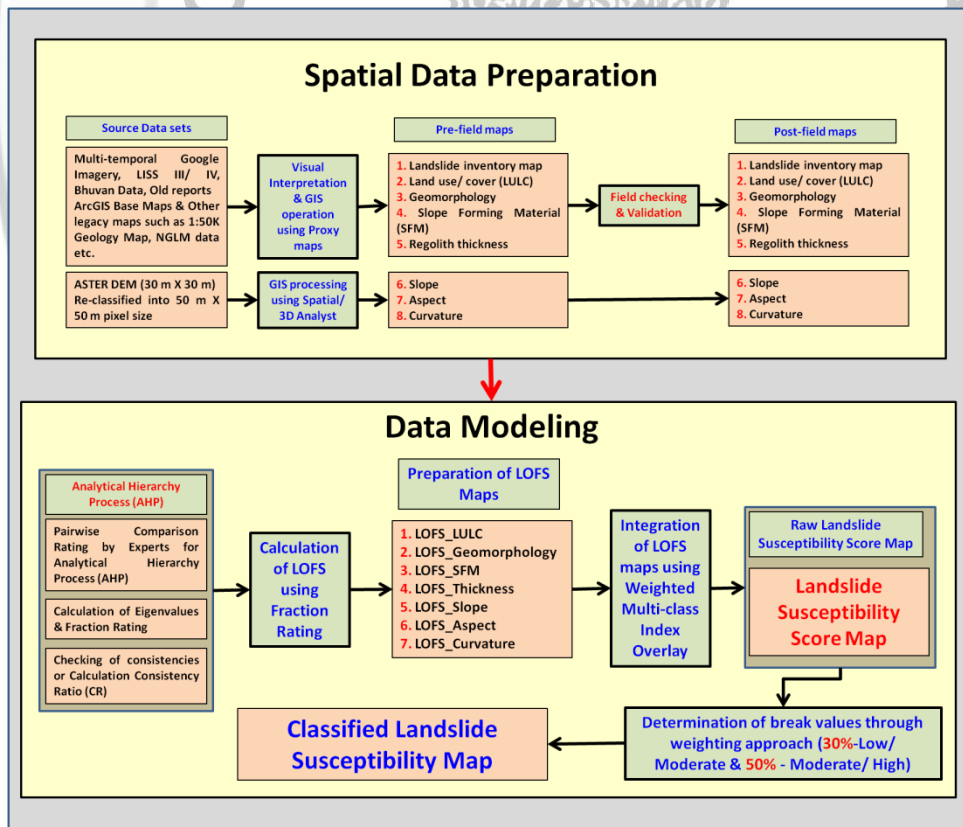
1.11.2. Field based studies/Ground check

- i) Ground check/ field checks of all geo-factor thematic maps.
- ii) Field validation of landslide inventory and collection of recent and historic landslides.
- iii) Collection of landslide inventory and damage data as per 42-point geo-parametric sheet.
- iv) Validation of landslide incidences at important locations.

1.11.3 Post field studies and modelling

- i) Updating of thematic and landslide inventory maps in GIS platform.
- ii) Pair wise correlation matrix calculation, determination of LOFS and Rank as per weightage/rating assigned to different thematic (causative factors) variables.
- iii) AHP based modelling and overlay analysis of different thematic maps for the preparation of Landslide susceptibility map on 1:50,000 scale on GIS platform.
- iv) To make seamless landslide susceptibility map edge matching done with adjacent toposheets such as 48N/4, 48K/13, 48O/2 and 48O/6.

Fig 1.1 Macro scale (1:50000) Landslide susceptibility Mapping Methodology



1.12 Rainfall data

Last ten year (2009-2019) rainfall data of Shimoga and Chikmagalur district (Annexure-I) is collected from DC office. The compilation of the last ten year rainfall data of Hosanagara taluk (**Fig 1.2**) reveals a remarkable correlation of rainfall and slope between. It is clear that one of the main triggering factors for landslide in the study area is rainfall. Compared to others in 2019 rainfall is maximum (4698mm) in the month of August (**Fig 1.3 and Fig 1.4**). The same is matching with the field observation. Natural landslides were occurred on 2019 all along the Budi Gudda, Vemalai Gudda and Devara Gudda and those landslide triggered by recent rainfall.

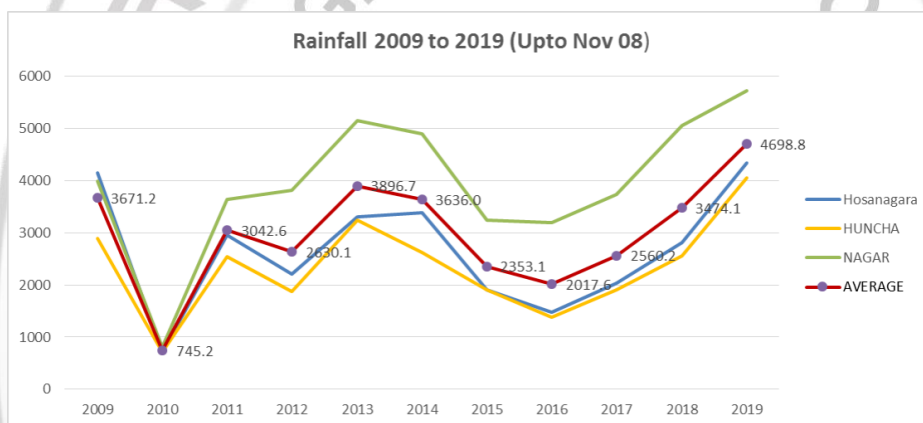


Fig 1.2 Last ten years (2009-2019) rainfall pattern of Hosanagara Taluk

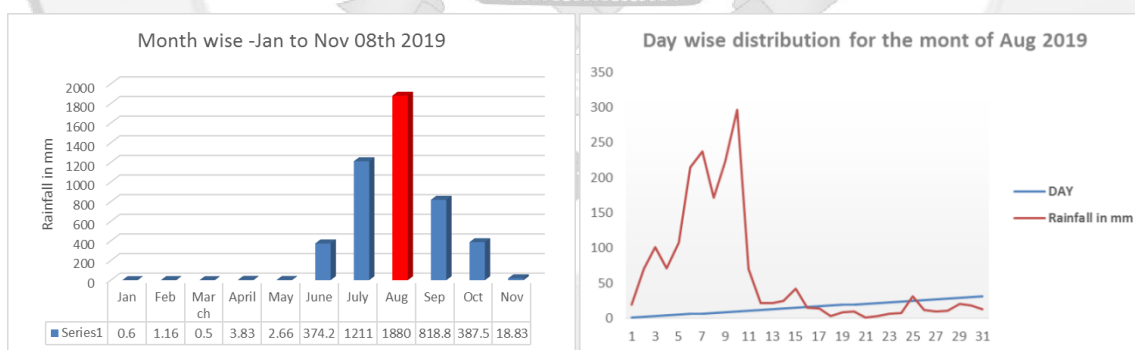


Fig 1.3 Month wise rainfall
Jan to 8th Nov 2019

Fig 1.4 Day wise rainfall for the month of August

1.13 Acknowledgement

The authors are grateful to Shri Ishwar Dan Ashiya, Dy. DG, SU: K&G and Shri J. Srihari (The and then Director, Technical Co-ordination) for extending technical support, during the execution of the work. We are thankful to Shri. T. Esakkimuthu, Superintending Geologist (Director, Technical Co-ordination) for his guidance and support. The author expresses their sincere gratitude to Shri K.V. Maruthi, Director for the supervision, guidance, help and assistance during the entire course of the Field season Programme. Authors are also thankful to the residents of Shimoga and Chikmagalur district for rendering cooperation and sharing their experiences and past landslide incidences during the field work.



2. PREVIOUS WORK ON LANDSLIDE STUDIES

Landslide inventory map has varied scopes and is prepared to understand the extent of landslide phenomena in an area and is a precursor of any landslide susceptibility mapping. Comprehensive landslide inventory is the prerequisite for subsequent studies and can be prepared through various methods such as mapping from remote sensing data and topographic maps, detailed field work and historical archival studies.

The present study area has not been covered by any scale of landslide studies. Hence Landslide inventory is prepared using multitemporal Google imagery in Arc GIS software. A total of 43 nos. of landslides are identified, the area by checking the temporal variation of Google imageries for the preparation of Landslide Inventory map. The same validated during the field work. Out of 43 inventories 20 nos. were validated in field. Rest of them was unidentifiable due to thick vegetation and inaccessibility. The details are represented in **Table 2.1**

Table 2.1 Location details of the identified landslides

Sl.No	Latitude	Longitude	Field validated Yes/No
1	14.07	75.36	No
2	13.76	75.24	Yes
3	13.76	75.24	No
4	13.76	75.24	No
5	13.76	75.25	No
6	13.78	75.27	Yes
7	13.78	75.27	No
8	13.75	75.27	No
9	13.75	75.27	No
10	13.75	75.27	No
11	13.78	75.29	No
12	13.78	75.29	No
13	13.81	75.28	No
14	13.77	75.32	No
15	13.77	75.33	No
16	13.77	75.33	No
17	13.8	75.32	No
18	13.85	75.4	No
19	13.93	75.18	Yes
20	13.92	75.18	Yes
21	13.92	75.18	Yes
22	13.92	75.18	Yes

23	13.93	75.21	Yes
24	13.94	75.21	Yes
25	13.89	75.17	Yes
26	13.98	75.09	Yes
27	13.98	75.06	Yes
28	13.98	75.05	No
29	13.99	75.03	Yes
30	13.77	75.05	No
31	13.84	75.16	Yes
32	13.75	75.05	No
33	13.77	75.04	Yes
34	13.84	75.01	Yes
35	13.87	75.05	Yes
36	13.88	75.12	No
37	13.88	75.11	No
38	13.88	75.11	Yes
39	13.84	75.16	Yes
40	13.83	75.16	No
41	13.86	75.16	Yes
42	13.84	75.19	Yes
43	13.9	75.06	No

3 LANDSLIDE INVENTORY

3.1 General

Landslide inventory is the basic input for landslide hazard mapping and planning mitigation measures. Landslide inventory maps contain a combined graphic and attribute database of a particular landslide and therefore landslide inventory is required to investigate the distribution, types, and patterns of landslides and their evolution in space and time. This map has varied scopes and is prepared to understand the extent of landslide phenomena in an area and is a precursor of any landslide susceptibility mapping.

3.2 Data source

There is no single ideal method for the preparation of a landslide geospatial database. Therefore combinations of several methods are made to generate the inventory which includes both the collection of historic records along with the use of remote sensing tool for accurate mapping of landslides. Landslide is a dynamic phenomenon and therefore its study and identification requires a source that will cater not only by providing spatial data but multi-temporal data. In the current study high resolution open source Google Earth imagery (from 2002 to 2019) has been used to obtain multi-temporal and spatial landslide inventory as the present study area has not been covered by any landslide studies in past.

3.3 Inventory Mapping

The following steps were used for mapping a landslide polygon in Arc GIS 10 and building its inventory attribute.

1. In Google Earth, every segment of the study area was viewed for all available time frames. Landslide is identified on the basis of morphological changes such as changes in slope type, breaks in slopes, hummocky surfaces, erosional scars etc. Identification of landslides becomes difficult if the morphological signatures are altered, either due to growth of vegetation, successive landsliding or anthropogenic disturbances. After the identification process the same is marked as a point because the landslide dimensions are very small.
2. The mapped point is then saved as .kml file and later imported to Arc GIS using “conversion” function. In Arc GIS the kml to layer conversion is first done and then the layer data is exported as a point shape file or directly to the geodatabase.
3. The attributes for each landslide polygon such as name, state, district, toposheet number, initiation and reactivation year based on dates of Google Earth images are entered.

4. A systematic and detailed field check was then carried out to validate the pre-field map at all the accessible locations. The morphological signatures left by landslides on slopes were used to identify the shape of landslides.

5. After identifying the landslides in the field, the morphological parameters viz landslide length, Width and Depth were noted carefully after measuring them in the field. Additional data such as landslide type, run-out distance, present land use, regolith thickness, probable cause, and damage details were also added to the inventory.

3.4 Spatial Distribution of Landslides

The pre-field landslide inventory data (**Plate 3.1**) have been collected for a total of 43 no's by using multi temporal Google imageries. Out of 43 landslides around 20 landslides were validated and appraised during the field studies. The identified landslides have been documented following the 42-point geo-parametric attributes **Annexure-II**. A total of 144 landslide incidences have been identified and inventoried during the field studies (including the 42 pre-field landslide incidences). On the basis of type of movement and material involved the landslides in the area can be classified into 4 groups such as Debris flow (14 nos.), Debris slide (75 nos.), Soil slide (55 nos.) and Rock slide (1no.).

These show a non-uniform spatial distribution in the area. Majority of the slide failure mechanism is shallow translational failure and are active or reactivated slope failures. Multiple causative factors involved in the formation of landslides. Most of the landslides in the area caused due to the human interference in modifying the existing natural slopes particularly to cutting of hill slopes for the modification for plantation, construction of road and modification for human settlement. The heavy rainfall during monsoon (second week of August 2019) is the major trigger for all the slides. Thick overburden thickness is also played a role.

In the study area most of the roads are passing through nearly flat terrain hence landslides along road sections are few. However landslides are observed along certain patches of road stretches like Hosanagara to Nagara, and few village link roads Nigilavani to Mavinahakkal. Ittiki to Hiregadde, Jakkanagadde to Mattige, Arodi to Sankodikoppa, Shilekuni to Kuduvalli and Hanigri to Kuduvalli roads. These are due to tampering of the natural slope for road construction triggered by monsoon rainfall. In Hosanagara to Nagara road section extensive slope cut critically modified the slope profile. Since the slope angle and height were less, so the

loss of property and loss of life is very less. But those slopes also have to be taken in to consideration to avoid the further failure and proper engineering structure to be given.

Natural landslides are very less in the toposheet no 48O/5 area. Large debris flows **(Photo 3.1a, 3.1b, 3.1c and 3.1d)** documented in the forest areas near Alase, Hanigeri, Hegalatti, Vemali Gutta and Devara Gudda of Toposheet no.48O/5. The causative factor is heavy rainfall during the fortnight of August 2019.

Majority of the landslides in the area are located vicinity to the cultivation or High Height Plantation especially Areca nut. The primary causative factors of these types of slides are cut slope failure with toe erosion by unlined drainage triggered by rainfall and in some cases thick slope forming material also play a vital role. In toposheet no 48O/1 most of the failure initiated adjacent to the cultivation. This type of slides is mainly debris slide **(Photo 3.2a, 3.2b, 3.2c, 3.2d, 3.2e, 3.2f, 3.2g, 3.2h and 3.2i)** and soil slide **(Photo 3.3a, 3.3b and 3.3c)**. One rock slide is documented at Guddekoppa village. This is a planar failure due to unfavorable joint pattern i.e. presence of three sets of joints and water percolation leads to failure of the slope intensified by toe cut of stream.

In villages like Jaddinagadde, Karagodu, Heggebailu, Malur and Kunnuru it is observed that the settlements are situated near to the crown part of the slide. Distance from crown to settlement ranges from 6-100m. At Malur the slides are located on both side of a small hillock which is in highly unstable condition because crown cracks were observed both the slides and also 4 to 5 houses are situated on the crown part nearly 5-10m from the slides and also many cut slope settlements also observed.

No landslides are documented in toposheet no 48N/8 as the area mainly comprised Pediplain-Pediment Complex and the Rolling Plain.

Plate 3.1

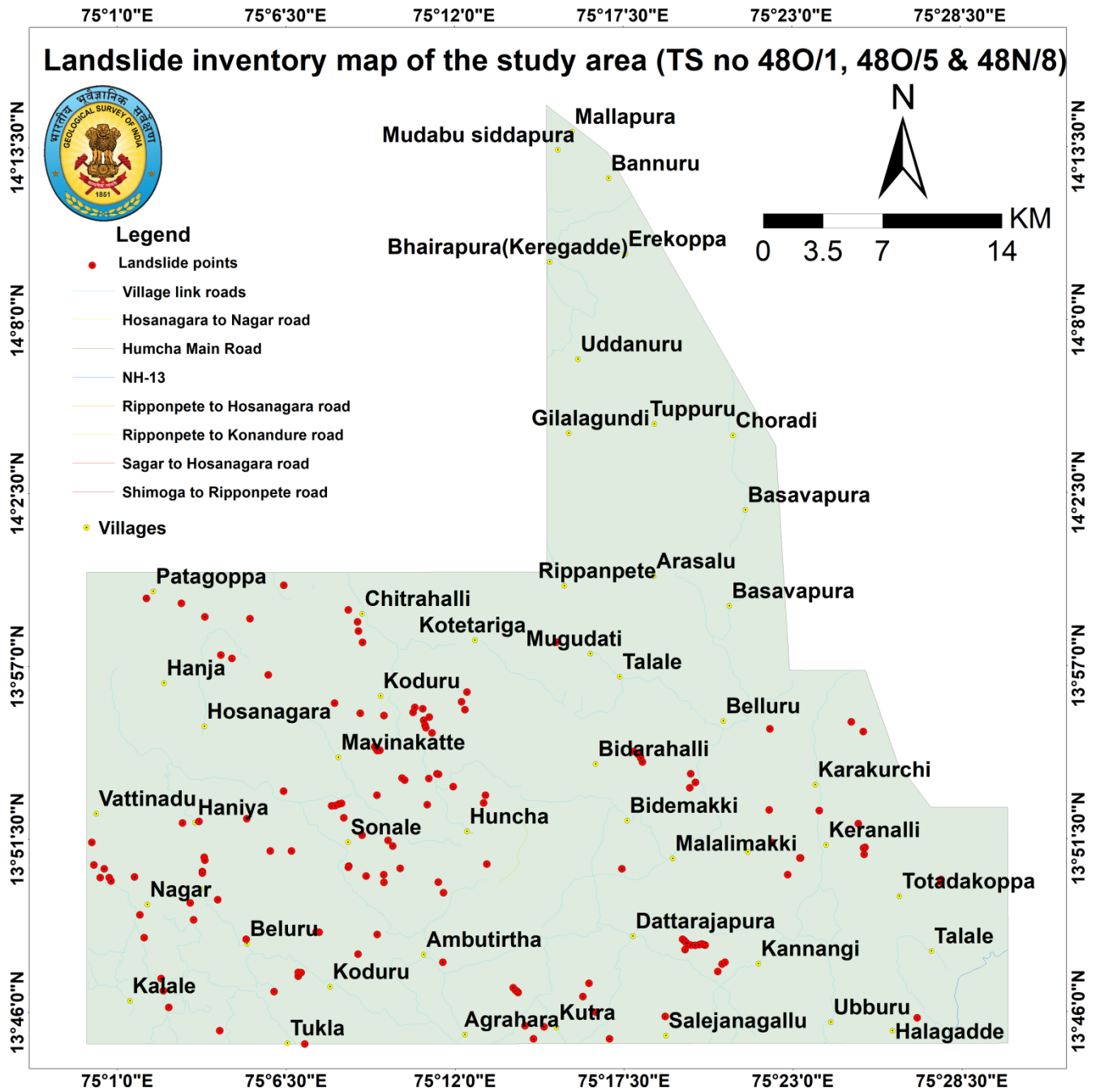




Photo 3. 1a Debris flow near Hegalathi village
(Lat:13° 50'7.27" Long: 74° 27'1 49.20")



Photo 3. 1b Debris flow near Hanigeri village (Lat: 13° 51' 13.71" Long: 75° 25' 21.87")



Photo 3. 1c Debris flow near Hanigeri village
(Lat: 13° 51' 0.47" Long: 75° 25' 20.02")



Photo 3. 1d Debris flow near Hanigeri village
Lat: 13°51' 58.88" Long: 75° 25' 8.30")



Photo 3. 2a Debris slide near Nagarakudige village
(Lat: 13° 51' 8.36" Long: 75° 05'59.39")



Photo 3. 2b Debris slide along SH-52
(Lat: 13°50'55.98" Long: 75°03'50.04")



Photo 3. 2c Debris slide near Borikoppa village
(Lat: 13°50'36.78"Long: 75° 08' 31.77")



Photo 3. 2d Debris slide near Kannuru village
(Lat: 13°55'6.1"Long: 75°11'01")



Photo 3. 2e Debris slide near Kannuru village
(Lat: 13°55' 6.1"Long: 75° 11' 01")



Photo 3. 2f Debris slide near Barahmeswara village
(Lat: 13°57'15.49"Long: 75°04'44.32")



Photo 3. 2g Debris slide near Surugodu village
Lat: 13°49'28.77"Long: 75°03'23.02"



Photo 3. 2h Debris slide near Nagara village
(Lat: 13°49'6.26"Long: 75° 01'44.56")



Photo 3. 2i Debris slide near Kodurutenkabailu village
(Lat: 13°47'9.16" Long: 75° 06'54.13")



Photo 3. 3a Soil slide near Karagodu village
(Lat: 13°55'37.41" Long: 75°12'19.90")



Photo 3. 3b Soil slide near Hiregadde village
(Lat: 13° 48' 33.11" Long: 75° 7' 34.77")



Photo 3. 3c Soil slide near Hosatota village
(Lat: 13°47'35.9" Long: 75° 10' 19.3")

4. LANDSLIDE SUSCEPTIBILITY ANALYSIS

4.1 Background

A quantitative or qualitative assessment of the spatial distribution of landslides in an area depicts the landslide susceptibility of that area. The combination of pre-disposing and triggering factors determines the spatial distribution of landslides. In mathematical form, landslide susceptibility is the probability of spatial occurrence of known slope failures, given a set of geo-environmental conditions (Guzzetti et al., 2005). Although it is expected that landslide will occur more frequently in the most susceptible areas, no time frame and magnitude of event are explicitly taken into account in the susceptibility analysis. A susceptibility map will therefore give qualitative or quantitative estimation of how the mapping unit (e.g., a pixel, slope unit or facet) will be susceptible to a potential future landslide. The cardinal aim of landslide susceptibility mapping is to identify locations where future landslides are likely to occur, based on the fundamental assumption that spatial factors that caused present and past landslides are likely to cause similar landslides in the future (Varnes, 1978; Guzzetti et al., 1999).

A wide range of techniques are available for landslide susceptibility mapping and their quantitative validation. In situation of complete non-availability of landslide inventory data, there is absolutely no remedy other than utilising complete expert or knowledge driven ratings and weights into susceptibility modeling despite its subjectivity. As prior knowledge of landslide is missing in the study area, Analytical Hierarchy Process (AHP) can be applied for preparation of final susceptibility map. Individual rating for geo-factor classes and weights of geo-factors have been determined using AHP after preparing the pairwise qualitative comparison matrix of all factors (Saaty, 1977).

4.2 Selection of preparatory factors

The purpose of accomplishing quantitative spatial association analyses in any predictive modeling of landslide susceptibility is to select and use only the good predictors, which are the spatial geo-factors that exhibit positive spatial associations with existing landslides. For susceptibility mapping, the selection of preparatory factors for landslides depends on the scale of analysis, the characteristics of the study area, the landslide type, the failure mechanisms and the prior knowledge of the main causes of landslides (Guzzetti et al., 1999; Glade and Crozier, 2005).

4.3 Geo-factor Themes

The factors which influence whether a landslide will occur typically include slope angle, climate, weathering, water content, vegetation, overloading, geology and slope stability. How these factors interrelate is important in understanding what causes landslides along with an understanding of the impact humans have on these factors by altering natural processes. No one theme or factor can be singularly attributed for the initiation of slope failures because it is the combination of various geo-environmental factors that act to initiate landslides in any given slope. The influence of the geo-factors will have spatial variation and also there can be temporal variation as most landslides are triggered by incessant rain during monsoon. Some of the geo-factor themes are categorical (e.g., geomorphology, aspect etc.) and others represent continuous data (e.g., slope, elevation etc.). For susceptibility analysis five factor maps viz, slope, landuse/landcover, geomorphology, slope forming material and regolith thickness were prepared that are considered to be the main spatial causal factors for landslides in the study area. These spatial factor maps are prepared using various source data and employing different mapping techniques which are detailed below.

4.3.1 Slope Morphometry

Slope morphometry is evaluated through Slope gradient, Slope aspect and Slope curvature. ASTER DEM data of 30 m spatial resolution which is freely available was downloaded and processed in Arc GIS to generate different slope morphometry thematic inputs such as slope angle, slope aspect and slope curvature maps on 1: 50,000 scale.

4.3.1.1 Slope angle

Various factors are responsible for the occurrence of the landslide. Slope is the measure of an angle between a location in the ground surface and the horizon which is the important factors that control the amount of material available for landslides, size and resultant landslides. Factor of safety for any given slope is critically determined by the slope gradient. The slope gradient map (**Plate 4.1**) defines slope categories on the basis of frequency of occurrence of particular angle of slope. In the study area, slope angle varies between 0° and 51°. The steep sloping hill situated at the eastern part of the toposheet no.48O/5. The slope gradient map derived is reclassified for analysis into 5 classes with 10 percentile distributions ranging from 0° to > 45°. Area percentage wise distribution of different slope categories in the study area (**Fig 4.1**) indicates that around 89.73% of the area is covered under slope class ranging between 0 to

15° which is having maximum number of small dimensional landslide incidences (nearly 71%). This category of slope angle range has minimum rating according to the ratings given in AHP and therefore minimum Landslide Occurrence Favorability Score. About 9% of the area falls in factor class 15° to 25° and 1.2% of the area falls in the 25°-35° class, which is having maximum weightage. 0.03% of area falls in the 35°-45° whereas > 45° class covers the minimum area i.e. .001%. About 71.52% of documented landslides have been observed in slopes class of 0°-15° slope angle at hill slope adjacent to the cultivation with thick mantle of loose material i.e. soil. The causes of slope failure are the unscientific way of modification or removal of soil for widening of agricultural land and removal of soil for plantation purposes. Further the slope become more vulnerable due to toe cut/erosion by flowing stream channel and removal of toe support during heavy rainfall. The natural slope having slope angle 0-15° is modified and extensive vertical road cut of 70-90° made for construction of new roads and widening of existing road resulted in slope failure rainy season. The exposed cut section paves new pathway for surface runoff, water seepage and slope saturation and reduces the cohesive and shear strength failure of slope forming material during prolonged incessant rainfall. Similarly, 19.44% of documented landslides have been observed in slopes class of 15°-25° and 9.02% in 25-35° (Fig 4.2). The ranking of slope angle along with LOFS is given in **Table 4.1**.

Table 4.1. Slope angle ranking and LOFS

Class	Rank	LOFS
< 15°	2	0.1631
15° - 25°	4	0.4597
25° - 35°	8	1.0000
35° - 45°	6	0.2817
> 45°	2	0.1631

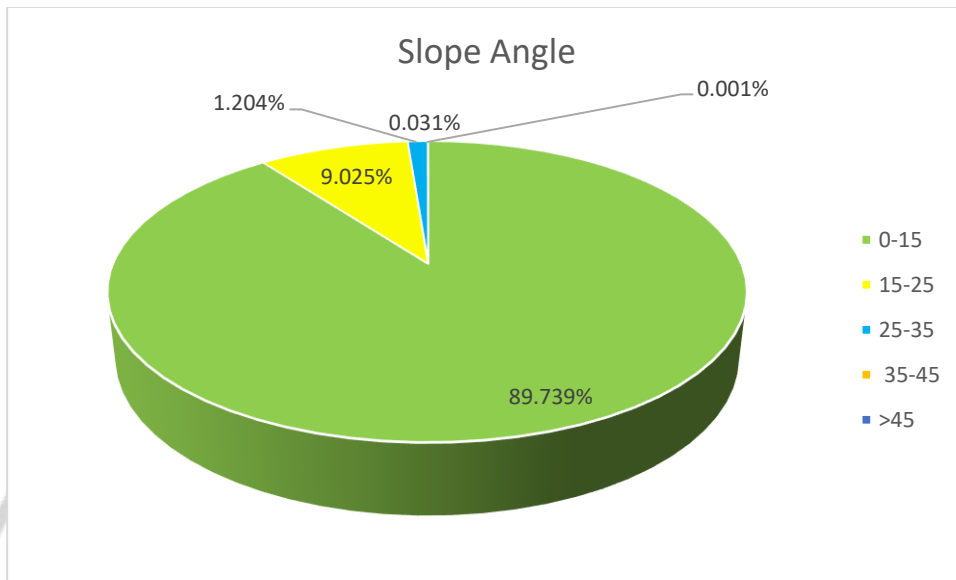


Fig 4.1 Area percentage wise distribution of different slope angle categories

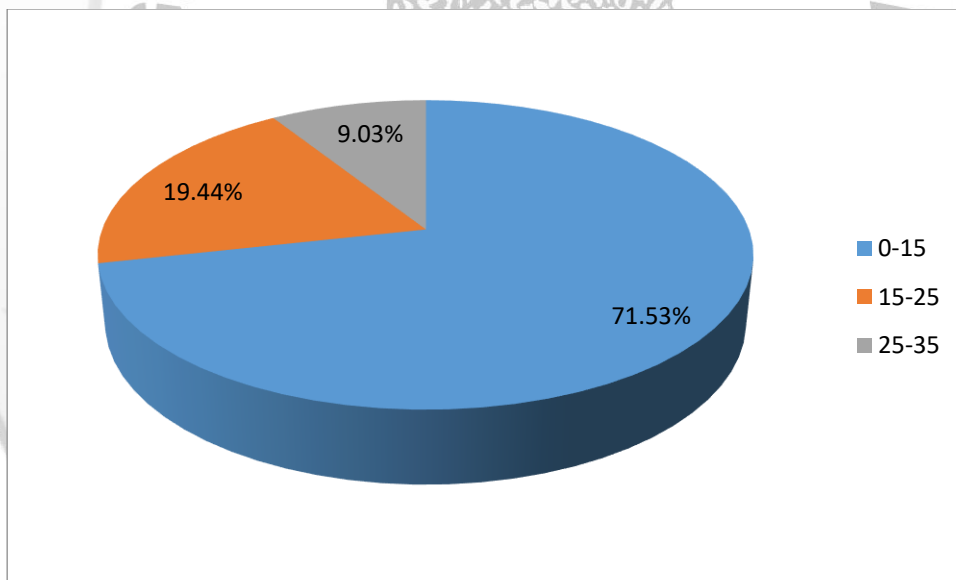
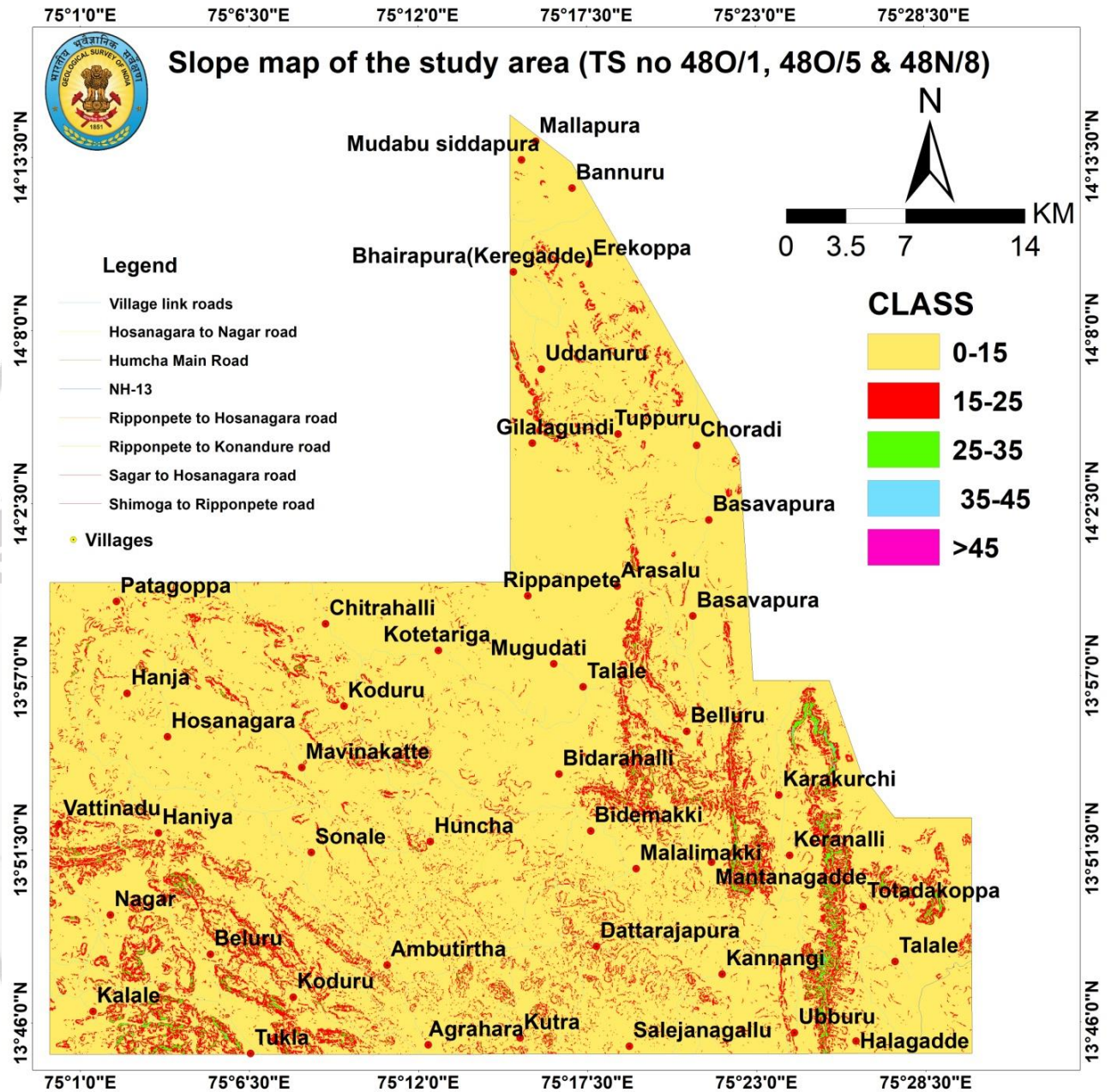


Fig 4.2 Slope angle Vs Landslide

Plate 4.1



4.3.1.2 Slope curvature

Slope Curvature Map shows negative and positive curvature values. A positive curvature represents upwardly convex surface, while a negative curvature indicates that the surface is upwardly concave at a given pixel. The concave hill slopes are having high soil moisture content and receive more surface run-off. Failures can be expected to occur more frequently in those areas than the slopes that are convex along the contour. The curvature maps were reclassified into three classes viz, concave, flat and convex (**Plate 4.2**). The distribution of the concave and convex curvature of slopes of the area is almost same ie. nearly 42% (**Fig 4.3**). The maximum weightage is given for the convex slope class. This Slope Curvature Map has not been considered for the landslide susceptibility analysis.

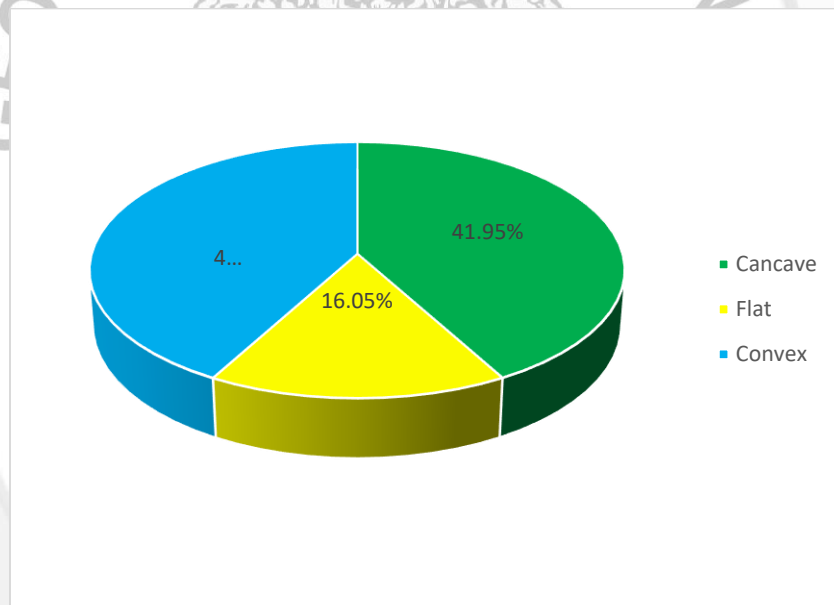
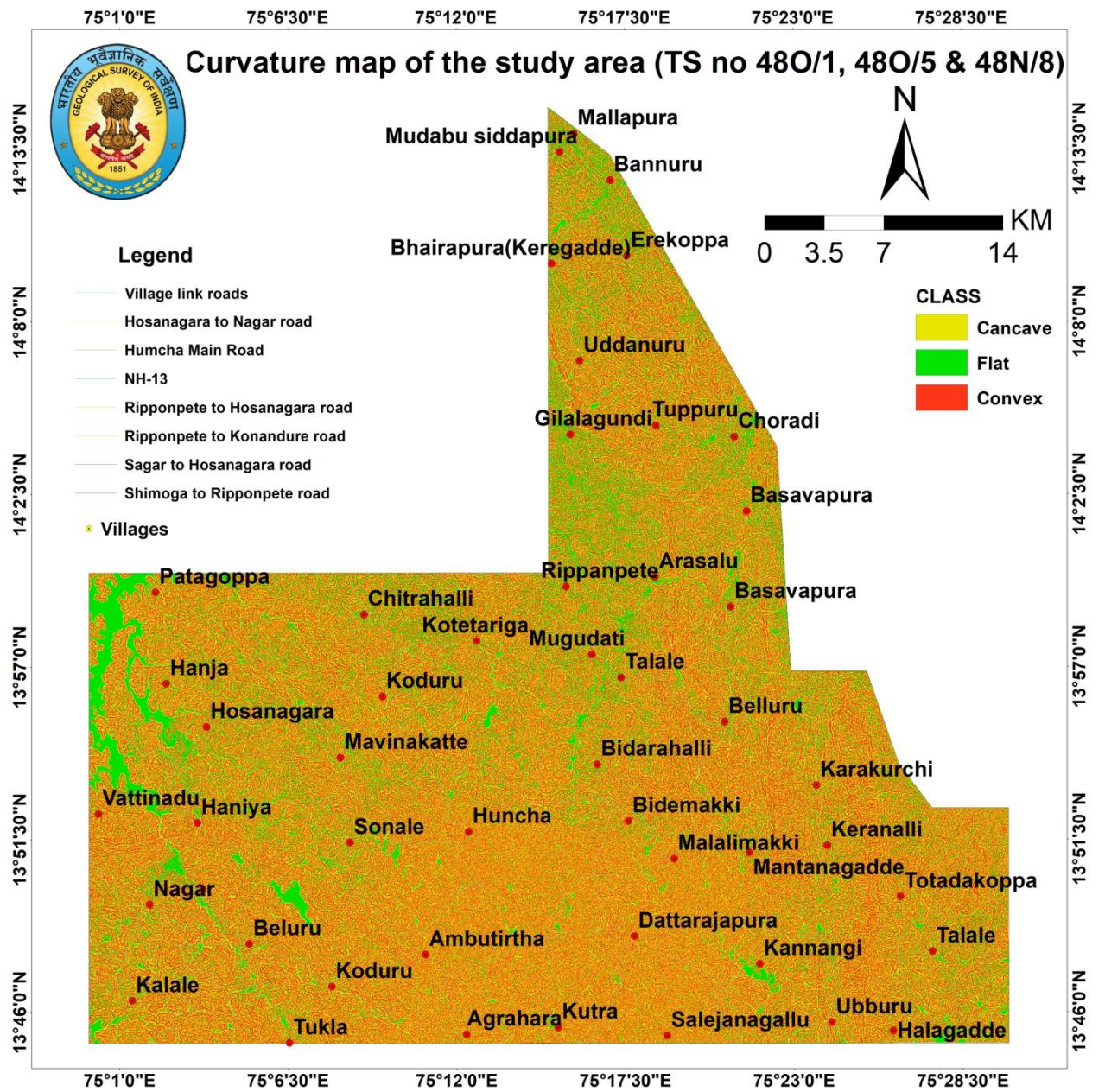


Fig 4.3 Slope curvature percentage distribution

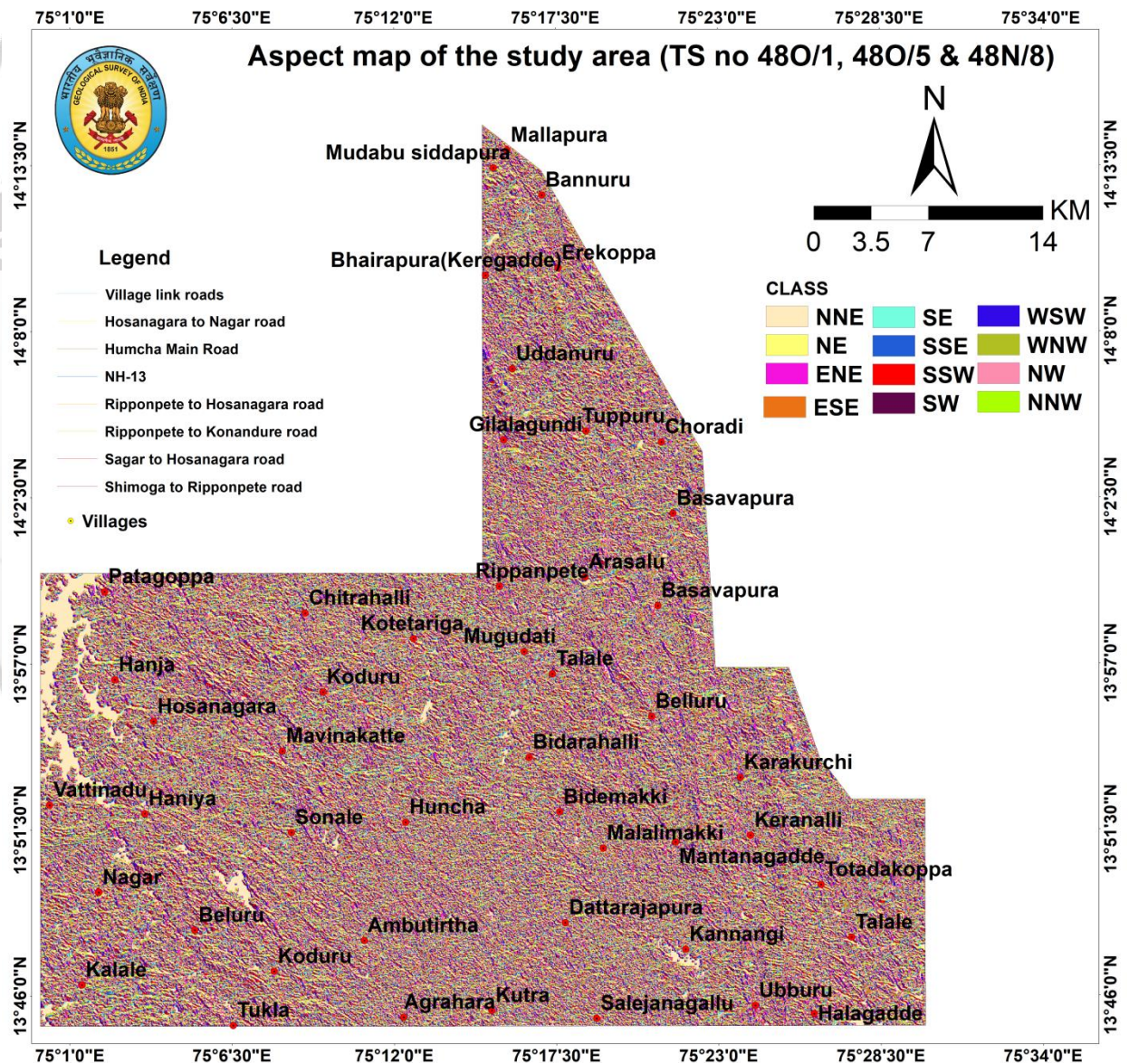
Plate 4.2



4.3.1.3 Slope aspect

Aspect is defined as the direction of the slope and in some cases of landslide cases; researchers have agreed that the slope aspect is one of the main reasons for the occurrences of landslides. Geofactor theme aspect is categorized into 12 classes namely NNE, NE, ENE, ESE, SE, SSE, SSW, SW, WSW, WNW, NW and NNW (**Plate 4.3**). In the present investigation, Slope aspect was not taken into consideration keeping in view its least significance.

Plate 4.3



4.3.2 Landuse and Land cover

Land Use & Land Cover map (**Plate 4.4**) was prepared in Arc GIS through visual interpretation multi-temporal Google Imageries of the area. The pre-field LULC map was checked in the field in all accessible locations and all necessary modifications in the boundary and name of the LULC class were incorporated. It is observed that pre-field map for LULC is mostly matching with the updated map except some parts of categories such as LHP, HHP, barren, sparse vegetation, cultivated, and settlement on modified slope.

A total of fourteen different landuse/landcover units are identified (**Photo 4.1a to 4.1d**) and mapped in the study area viz. Barren, Cultivation, Extensive Slope Cut, Fallow land, Moderate vegetation, High Height Plantation (HHP), Low Height Plantation (LHP), Quarry, River, Settlement, Settlement on modified Slope, Sparse Vegetation, Thick Vegetation and Water body. Thick vegetation covers most of the area (39.6%), this may be due to the intensity of Reserve forests in the area. Valley portion extensively used for cultivation and High height plantation such as arecanut, coconut, rubber acacia, eucalyptus and nilgiri. Low height plantation includes cashew, pepper and a very few coffee plantations.

The most of the slope failures identified in the area are confined to the extensive slope cut for roads or adjacent to the cultivation where slope modified. Maximum weightage of 9 given to extensive slope cut category (**Table 4.2**). Area percentage wise distributions of various LULC categories in the study area are given in **Fig 4.4**. Nearly half of the landslide incidence is over thickly vegetated and high height plantation area (62.50%), **Fig 4.5**. This is due to the encroachment of cultivated area towards hill slide by modifying the slope. The Fig 4.4 shows the percentage of landslide incidence over different LULC categories

Table 4.2 Land use and Land cover classes with rating and LOFS values.

Landuse/Landcover	Rating	LOFS
Barren	1	0.0626
Cultivation	2	0.0937
Extensive Slope Cut	9	1
Fallow ground	1	0.0626
Moderate Vegetation	5	0.2912
Plantation (HHP)	4	0.1988
Plantation (LHP)	3	0.1366
Quarry	5	0.2912
Settlement	1	0.0683

Settlement on modified slope	7	0.5631
Thick Vegetation	4	0.1988
Sparse Vegetation	7	0.5631
Water body	0	0
River	0	0

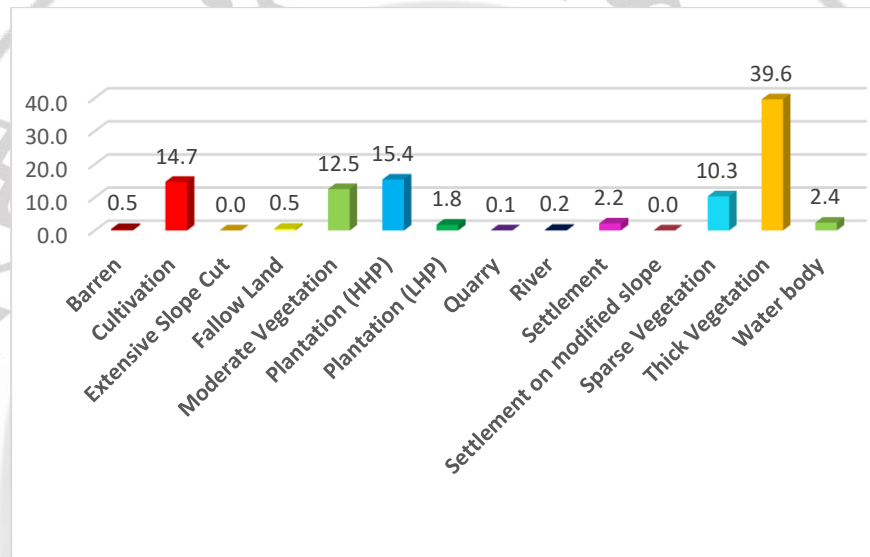


Fig 4.4 Area percentage wise distributions of various LULC categories

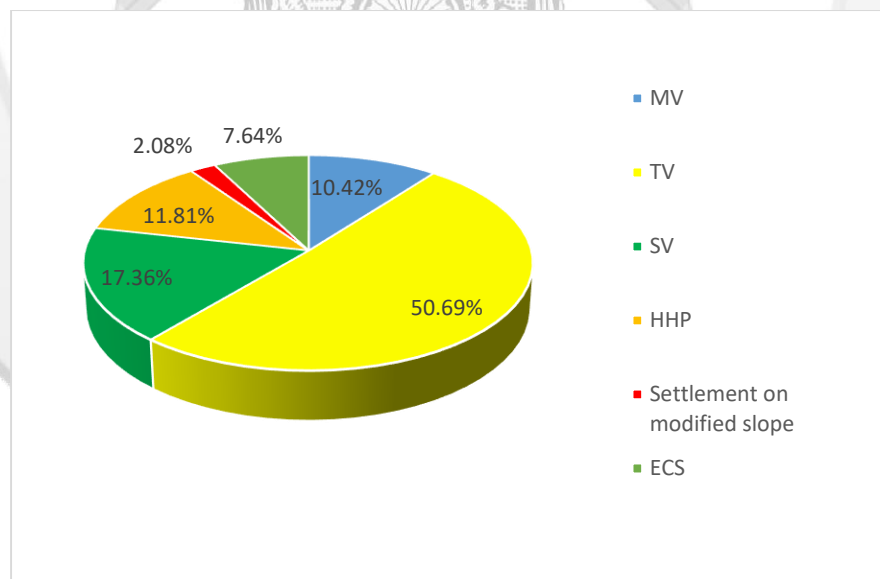


Fig 4.5 LULC Vs Landslide



Photo 4.1a Settlement on modified slope
(Lat: 13°47' 3.1" Long: 75° 20' 54.6")



Photo 4.1b Barren
(Lat: 13°48'57.7" Long: 75° 12'41.8")

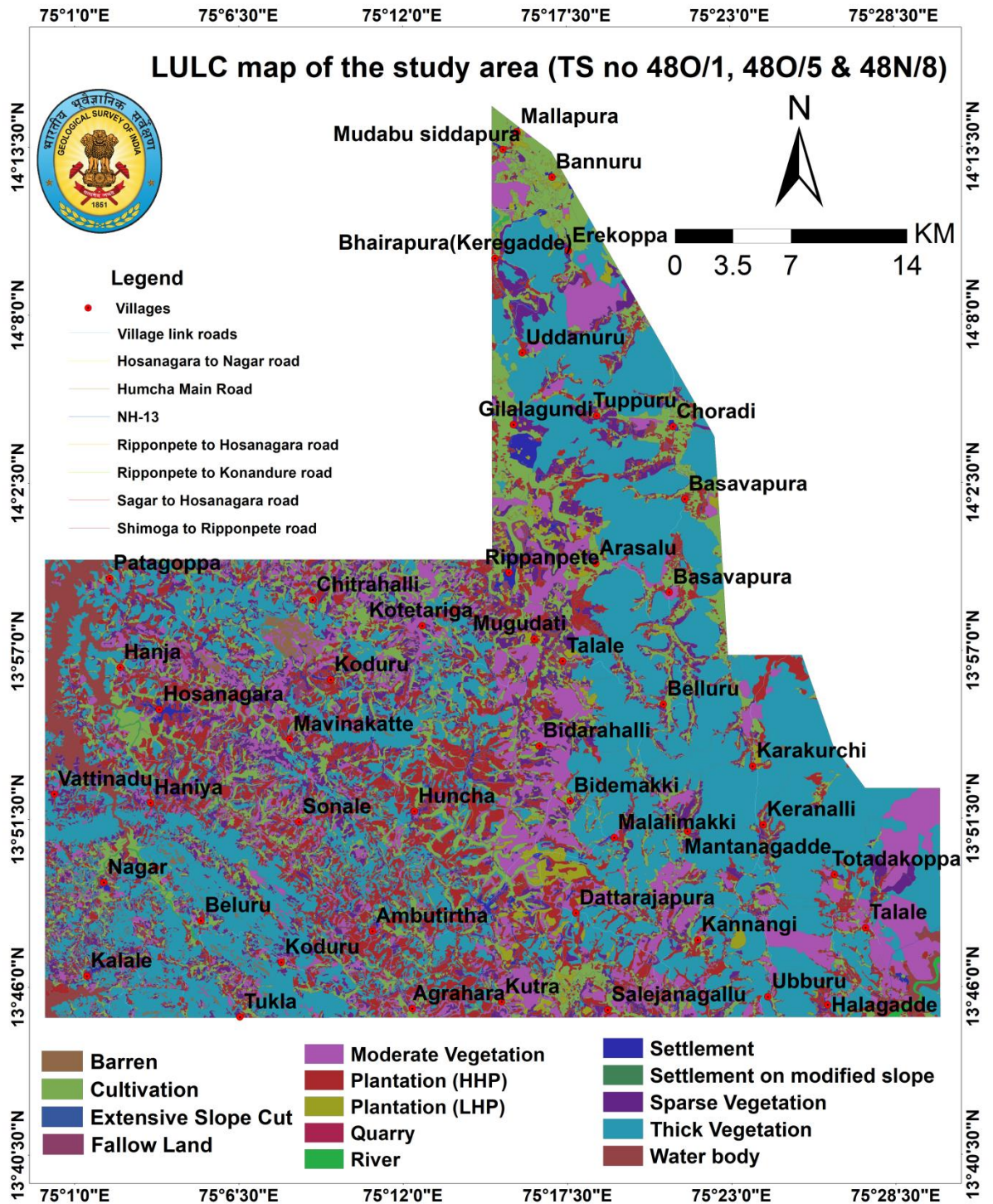


Photo 4.1c Extensive slope cut
(Lat: 13°50'55.98" Long: 75° 03'50.04")



Photo 4.1d Cultivation
(Lat: 13°49'35.4" Long: 75° 15'28.1")

Plate 4.4



4.3.3 Geomorphology

Pre-field Geomorphology map was prepared in ArcGIS through visual interpretation of latest available Google Earth imagery as base map. NGLM data supplied by GHRM cell was also taken into account while preparing this map. This pre-field geomorphology map was validated at all accessible locations during field work and necessary modifications were incorporated in the final input geomorphology map (**Plate 4.5**).

Nine geomorphic units are identified in the study area (**Photo 4. 2a to 4.2d**). They are Hill-top, moderately dissected slope, Lowly dissected slope, Pediment pediplain complex, Ridge-top, Rolling plain, Valley fill, River and Waterbody. The area percentage wise distribution of various geomorphologic units in the study area (**Fig. 4.6**) shows that Lowly dissected slope (29.51%) is the predominant geomorphic unit in the area followed by Rolling plain (25.87%) and moderately dissected slope (21.77%). Ferruginous phyllite forms the Ridge-top and is situated at Ubburu RF. Hill top is observed in the southern part of toposheet no.48O/1 and centre part of toposheet no.48N/8. Valley fills are more in toposheet no.48O/1. Moderately dissected slope, Lowly dissected slope, Pediment pediplain complex and Rolling plain distributed all over the area. Considering all natural slides (debris flow), they fall over the moderately dissected slope (37.5%). This is because here slope angle varies from 15-35°. Similarly over lowly dissected slope and rolling plain the landslide distribution is 63.89% (**Fig 4.7**). This is due to anthropogenic interference with the slope like reprofiling of the slope for cultivation, settlement, road etc. The Geomorphology units with rating and LOFS values are given in **Table 4.3**.

Table 4.3 Geomorphology classes with rating and LOFS values.

Geomorphology	Rating	LOFS
Lowly Dissected Slope	4	0.1947
Moderately Dissected Slope	6	0.402
Ridge - top	0	0
River	0	0
Water body	0	0
Rolling Plain	0	0
Valley Fill	0	0
Pediment pediplain complex	0	0
Hilltop	0	0

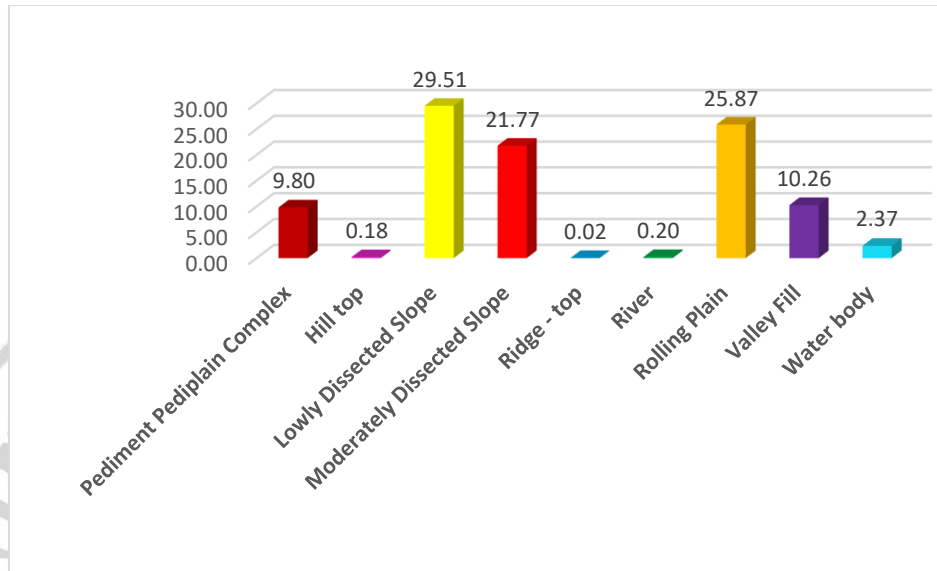


Fig. 4.6 The area percentage wise distribution of various geomorphologic units

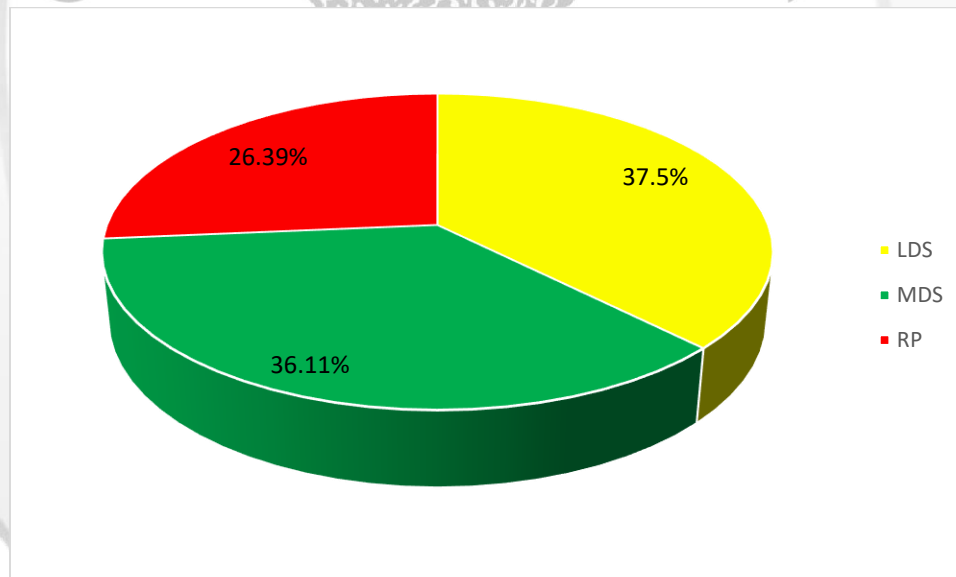


Fig 4.7 Geomorphology Vs Landslide



Photo 4.2a Moderately dissected slope
(Lat: 13°51'13.71" Long: 75° 25'21.87")



Photo 4.2b Pediplain pediment complex
(Lat: 13°47'10" Long: 75° 24'28.09")

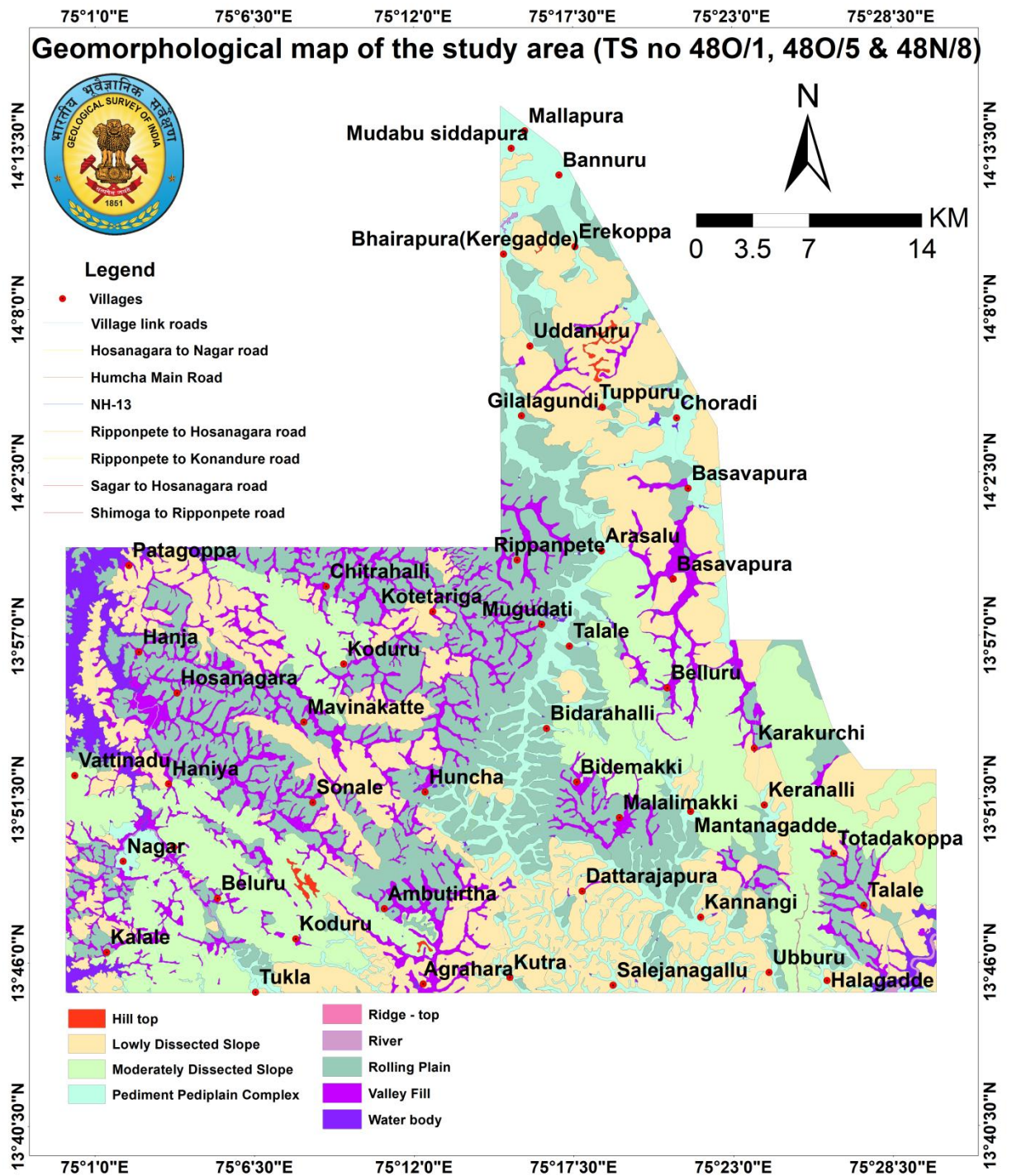


Photo 4.2c Rolling plain
(Lat: 13°06'30.8" Long: 75° 19'7.7")



Photo 4.1d Lowly dissected slope
(Lat: 14°4'7.2" Long: 75° 16'00.4")

Plate 4.5



4.3.4 Slope Forming Material (SFM)

The pre-field Slope Forming Material (SFM) map is prepared by using proxies of the existing geological legacy map of 1:50K available with GSI and the already prepared geomorphology and LULC maps. With the help of geomorphology map, attempts have been made to categorize the overburden polygons into different types. This pre-field map is validated and updated (**Plate 4.6**) in the field at all accessible locations. The different classes of SFM in the road cut, quarry section, nala cut section and other excavation is studied to get better idea. The slope forming material (**Photo 4.3a to 4.3d**) is broadly divided into rocks, insitu soil, loose slide debris and transported soil. Insitu soil covers the major part of the area (66.24%) followed by transported soil and granite gneiss (**Fig 4.8**). Transported material is lying over gentle slopes and is relatively assessed to be less susceptible to landslides. Maximum weightage given to the loose slide material and is mostly observed in extensive cutting slopes and old slide areas. The ranking of different SFM classes and LOFS given in **Table 4.4**

Table 4.4 Slope Forming Material classes with rating and LOFS values

Class Name	Rank	LOFS
In – situ Soil	4	0.2409
Loose Slide Debris	8	0.0682
Rock Class Type – I	1	0.0978
Rock Class Type – II	2	0.2409
Rock Class Type – III	4	0.1506
Transported Soil	3	0.5437
Water	0	0

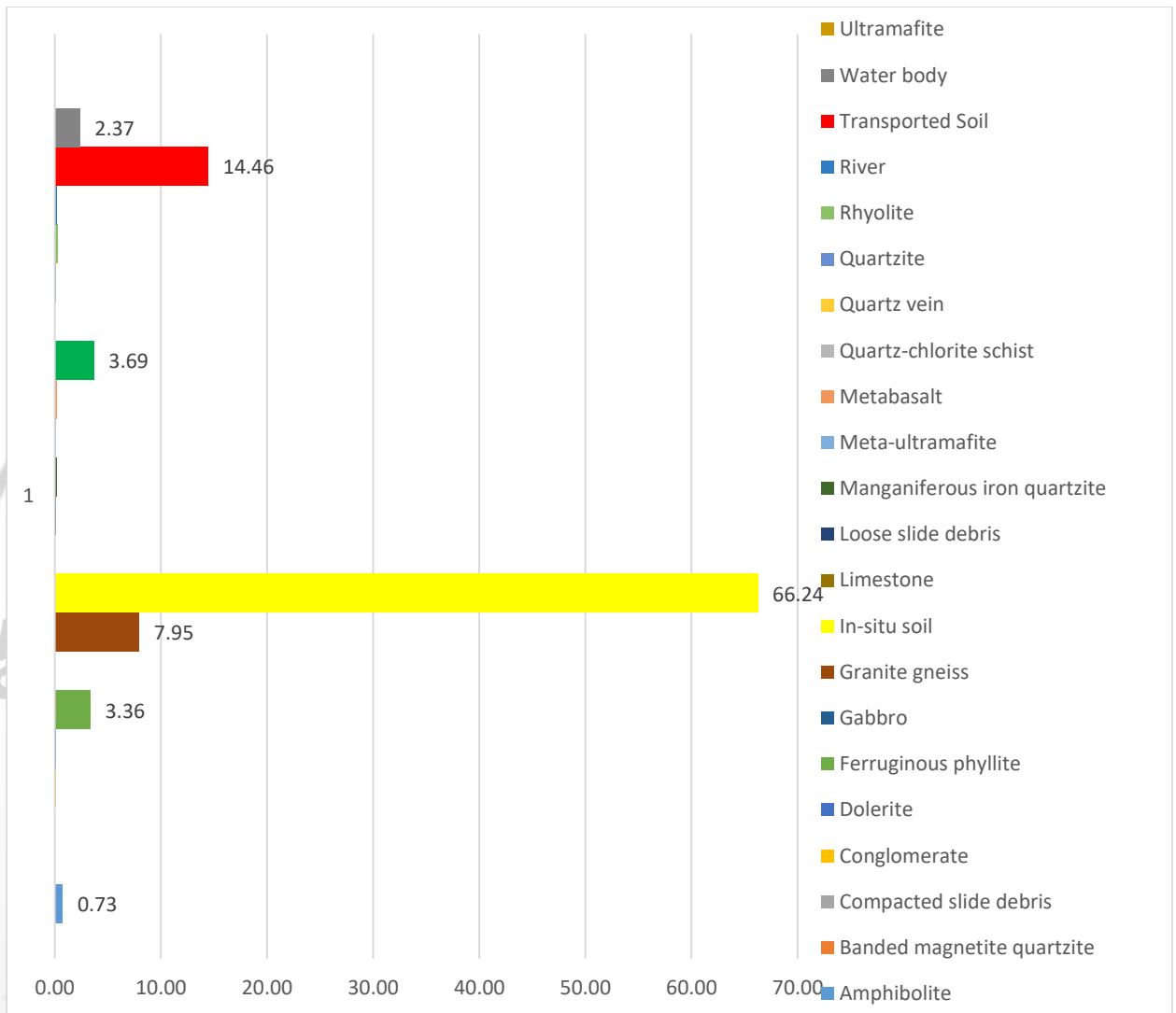


Fig. 4.8 SFM classes percentage distribution of the study area



Photo 4.3a Insitu soil
(Lat: 13°49' 23.3" Long: 75° 15'27.2")



Photo 4.3b Granite Gneiss
(Lat: 13°46'52.7" Long: 75° 05'42.2")

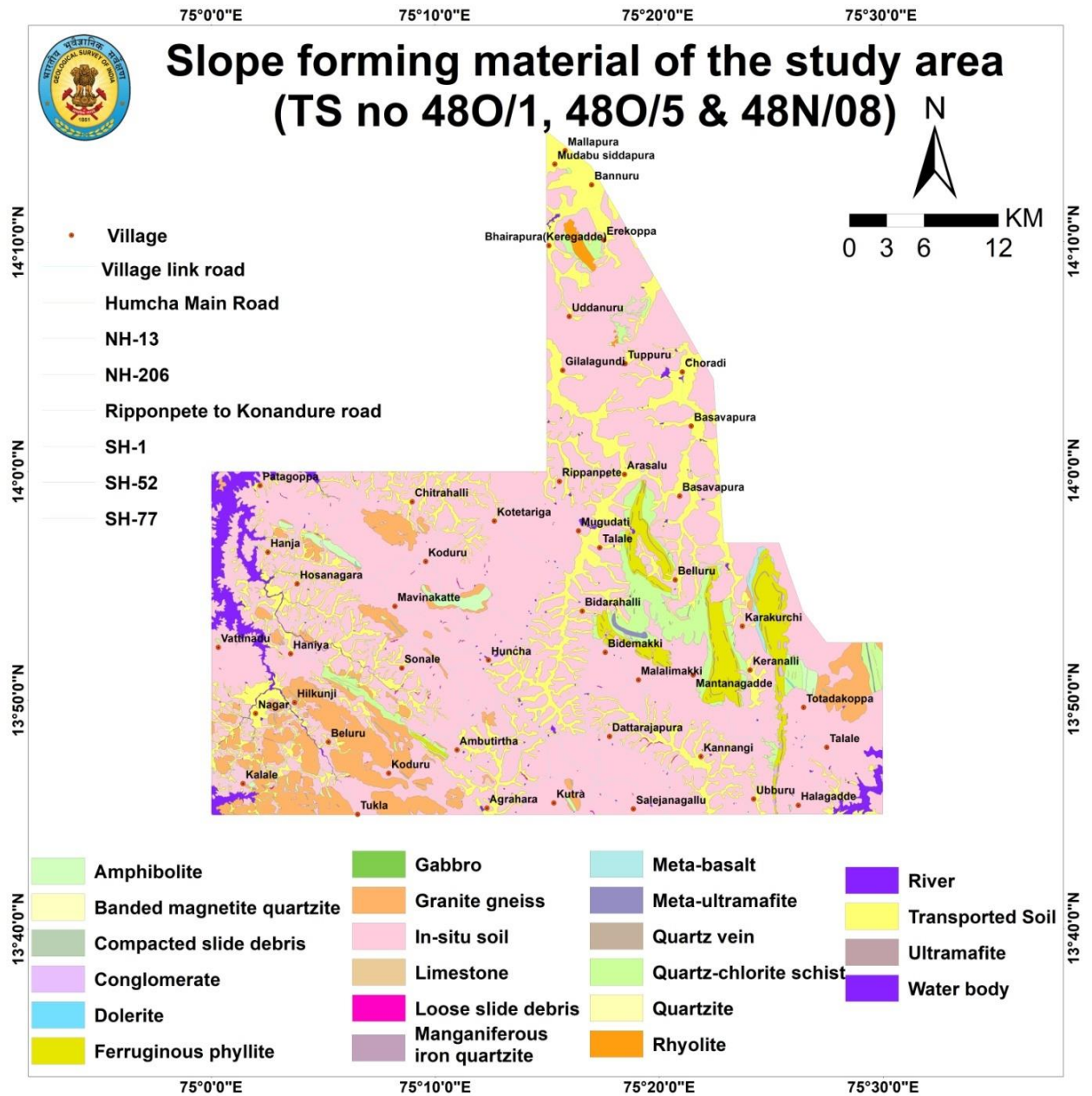


Photo 4.3c Loose slide debris
(Lat: 13°50'36" Long: 75° 08'31.7")



Photo 4.3d Transported soil
(Lat: 13°52'54.38" Long: 75° 09'27.79")

Plate 4.6



4.3.5 Regolith Thickness

Regolith is a region of loose unconsolidated rock and dust that sits atop a layer of bedrock. The pre-field Regolith thickness also prepared from the proxies of the existing geological legacy map of 1:50k available with GSI and the already prepared geomorphology and LULC maps. This map is validated and updated in field by studying the road cut, stream cut sections and slide scar faces. Four major classes of regolith thickness such as <0.5m, 0.5-5m, 5-10m, >10m identified in the area (**Photo 4.4a to 4.4d**). Based on this regolith thickness map (**Plate 4.7**) is prepared. The regolith thickness distribution of classes 0.5-5m and 5-10m is almost similar in the area. ie. 33.14% and 33.42% respectively (**Fig 4.9**). 0.5-5m thickness distribution is more in toposheet no.48O/1 whereas 5-10m is more in toposheet no.48O/5. The distribution of landslide incidence over 0.5-5m and 5-10m class is almost same, nearly 33% (**Fig 4.10**). Most of the slides near the cultivated land are due saturation of thick overburden and toe erosion by nala. Regolith thickness classes with rating and LOFS values are given in **Table 4.5**.

Table 4.5 Regolith thickness classes with rating and LOFS values.

CLASS	Rank	LOFS
< 0.5 m	0	0
0.5 - 5 m	7	1
5 - 10 m	4	0.32296
>10m	2	0.13627

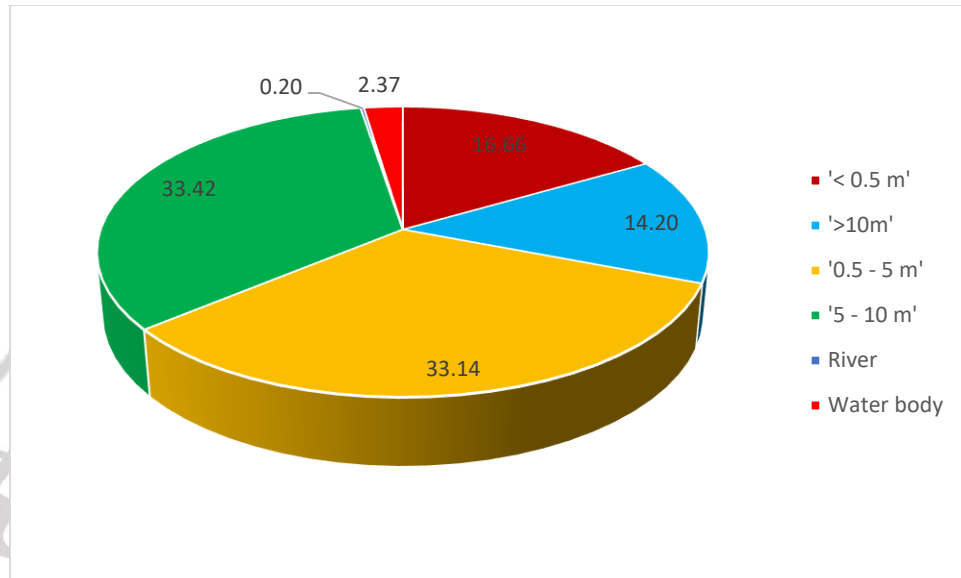


Fig.4.9 Regolith Thickness percentage distribution

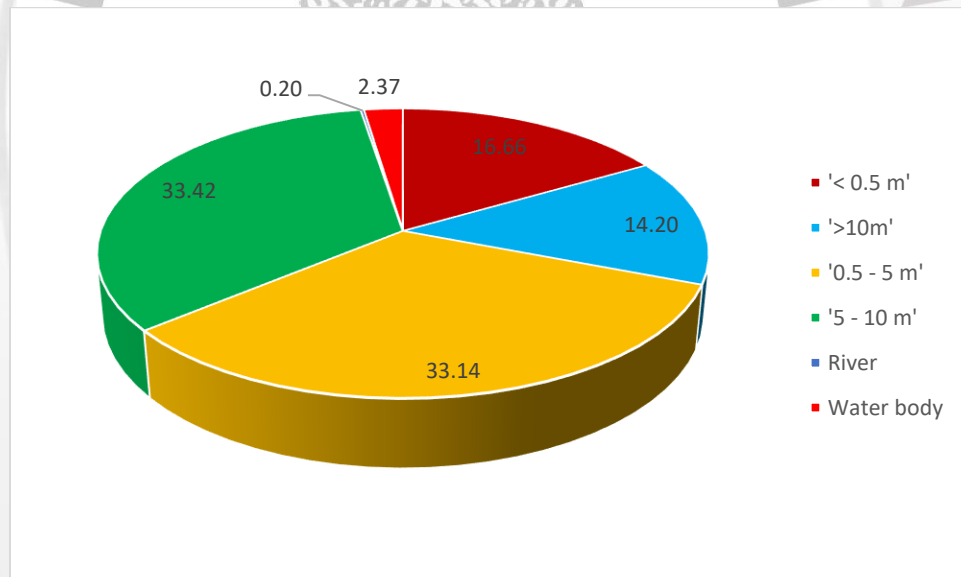


Fig 4.10 Regolith thickness Vs Landslide



Photo 4.4a Regolith thickness 0.5-5m
(Lat: 13°47'3.1"Long: 75° 20'54.6")



Photo 4.4b Regolith thickness <0.5m
(Lat: 13°49'45.57"Long: 75° 7'2.20")

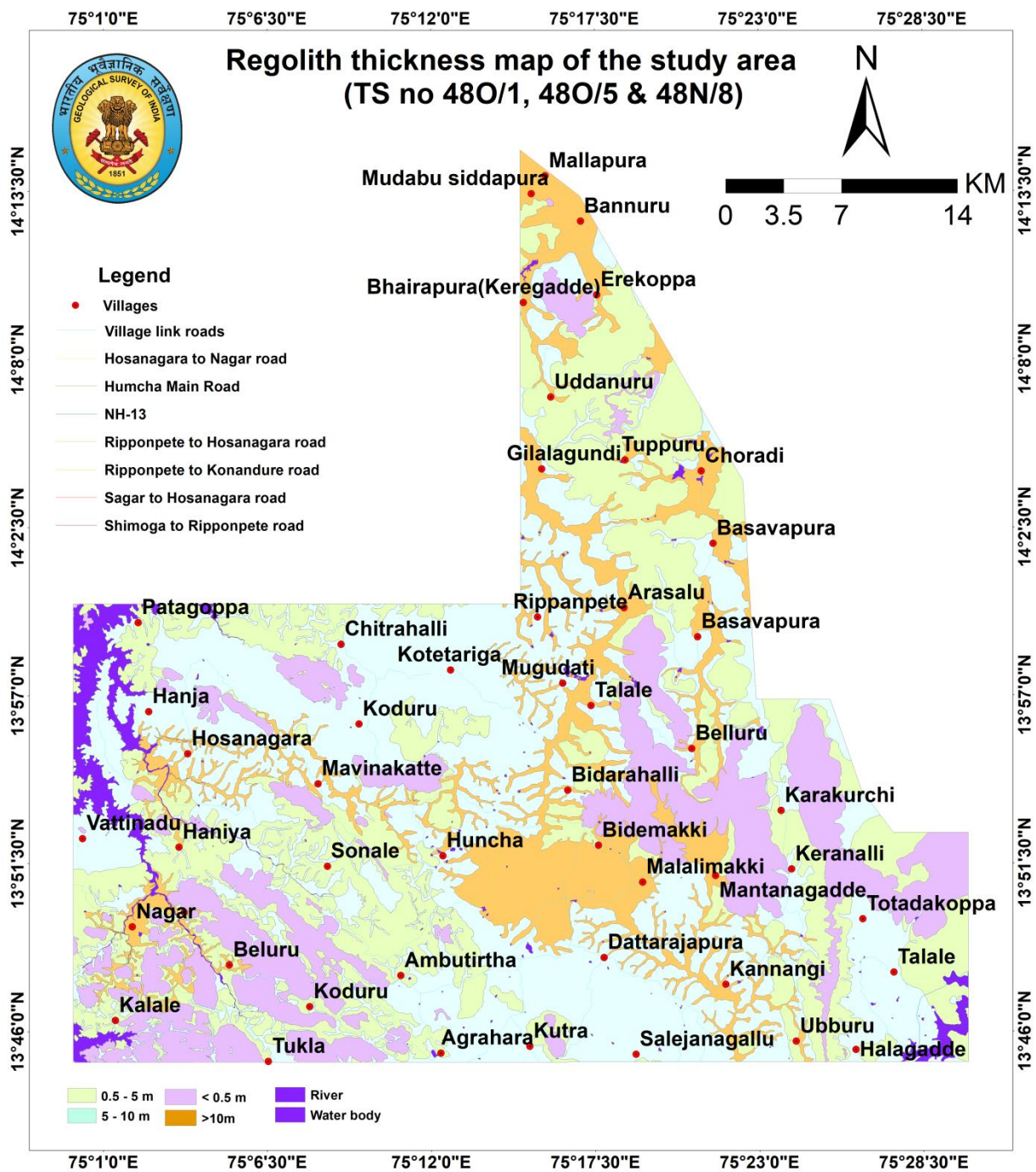


Photo 4.4c Regolith thickness 5-10m
(Lat: 13°51'17.64"Long: 75° 09'88.84")



Photo 4.4d Regolith thickness >10m
(Lat: 13°53'26.22"Long: 75° 10'16.25")

Plate 4.7



4.4 Landslide Susceptibility Analysis (AHP)

The most of the slope failures identified in the area are confined to the extensive slope cut for roads or adjacent to the cultivation where slope modified by anthropogenic activity. Hence for the current study, knowledge-driven (heuristic) method is made use to arrive at spatial relation between landsliding and relevant geo-factors. The concept of Analytical Hierarchy Process (AHP) is developed by Saaty, (1977) for pairwise analysis of priorities in multi-decision making. It is an effective tool for dealing with complex decision making and helps prioritize different criteria used in various studies. This is achieved by reducing complex decisions to a series of pairwise mutual comparisons, and then synthesizing the results. The AHP also incorporates a useful technique for checking the consistency of the decision maker's evaluations for any deviation or inconsistency developed in the process.

4.4.1 Methodology

The AHP consists of three levels of hierarchy.

- The first hierarchy level is the goal of the decision making.
- The second level involves how each of the existing criteria contributes to achievement of goal.
- The third level is to find out how each of the alternatives contributes to each of the criteria.

The AHP method is appropriate and to be used where decisions are to be assessed quantitatively. It is assumed that human beings' natural reaction when facing a complex decision making process, is by grouping the decision elements according to common characteristics. This involves ranking the decision elements, and then comparing between each pair in each group in a form of matrix. Then inconsistency ratio and weight for each element can be measured. This provides ease in testing the data consistency. The higher consistency ratio, the assessment result becomes more inconsistent. The acceptable consistency ratio is less than or equal to 10%.

According to Taylor, Consistency Index (CI) can be calculated by using the following formula:

$$CI = \frac{\lambda_{\max} - n}{n - 1} \quad \text{Eq-1}$$

$$\lambda_{\max} = \frac{1}{n} \sum_{i=1}^n w_i \cdot c_i \quad \text{Eq-2}$$

The consistency ratio is then calculated as,

$$CR = CI / RI \quad \text{Eq-3}$$

Where, n is the amount of items compared, w_i is the weight, c_i is the sum of column, CR is the Consistency Ratio, CI is the Consistency Index and RI is the Random Consistency Index. If $CR \geq 10\%$, the data acquired is inconsistent and If $CR < 10\%$, the data acquired is consistent. The ratio-scale form is used as an input. The values in the ratio are organized in a matrix, which is called the pairwise comparison matrix. In the AHP method, the scale range 1–9 is assumed. It is limited to a ratio-scale 1–9 because according to the research conducted by Miller, human beings cannot simultaneously compare more than seven objects. The Standard Preference Scale used is given in **Table 4.6**

Table 4.6 Standard preference scale

Preference Level	Numerical Value
Equally Preferred	1
Equally to Moderately Preferred	2
Moderately Preferred	3
Moderately to Strong Preferred	4
Strongly Preferred	5
Strongly to Very Strongly Preferred	6
Very Strongly Preferred	7
Very Strongly to Extremely Preferred	8
Extremely Preferred	9

Using the above Standard Preference Scale, GSI, being the Nodal Agency for landslide studies in India assigned for the preparation of a seamless landslide susceptibility map of India by giving weightage to the factor classes and the factor maps in Arc GIS. The obtained score for individual factor class was used for determining the ratings for each factor class. The average score for the factor maps were ranked between 0 and 9. Matrix of pairwise ratings; estimated eigenvectors of pairwise rating matrix; and estimation of consistency vector (CV), consistency index (CI) and consistency ratio (CR) for judgment of consistency of pairwise ratings of factors, respectively for all maps was calculated.

For determination of Predictor Weight for the geo-factor, one comparison matrix is calculated in Microsoft excel software for the pair wise qualitative comparison of all the geo-factors. In the comparison matrix, fraction weight is calculated for all the geo-factors. Once the LOFS values for geo-factor sub classes are determined, all the LOFS values against the sub

classes are compiled in an excel sheet. Then the LOFS attributes are joined in the raster map attribute table using “join and relates” option. Finally, LOFS map of the geo-factor is prepared with the help of “Lookup” command in Arc GIS, using raster map of the geo-factor as “input raster” and “geo-factor_LOFS\$LOFS” as lookup field.

Once all the fraction weights are determined, minimum value within the fraction ratings is identified using the “MIN” command in excel software. Then all the fraction weight values are divided with the minimum fraction weight value to determine the Predictor Weight or weight of geo-factors. In this way, as the fraction weights are divided with the minimum fraction weight value, the Predictor Weight or weight values will be one or more than one. For each geo-factor, consider the nearest whole number as its Predictor Weight or weight. For generation of “Raw Landslide Susceptibility Score Map” in Arc GIS, “raster calculation” command under map algebra is used. For “Raw Landslide Susceptibility Score Map” the following formula is used.

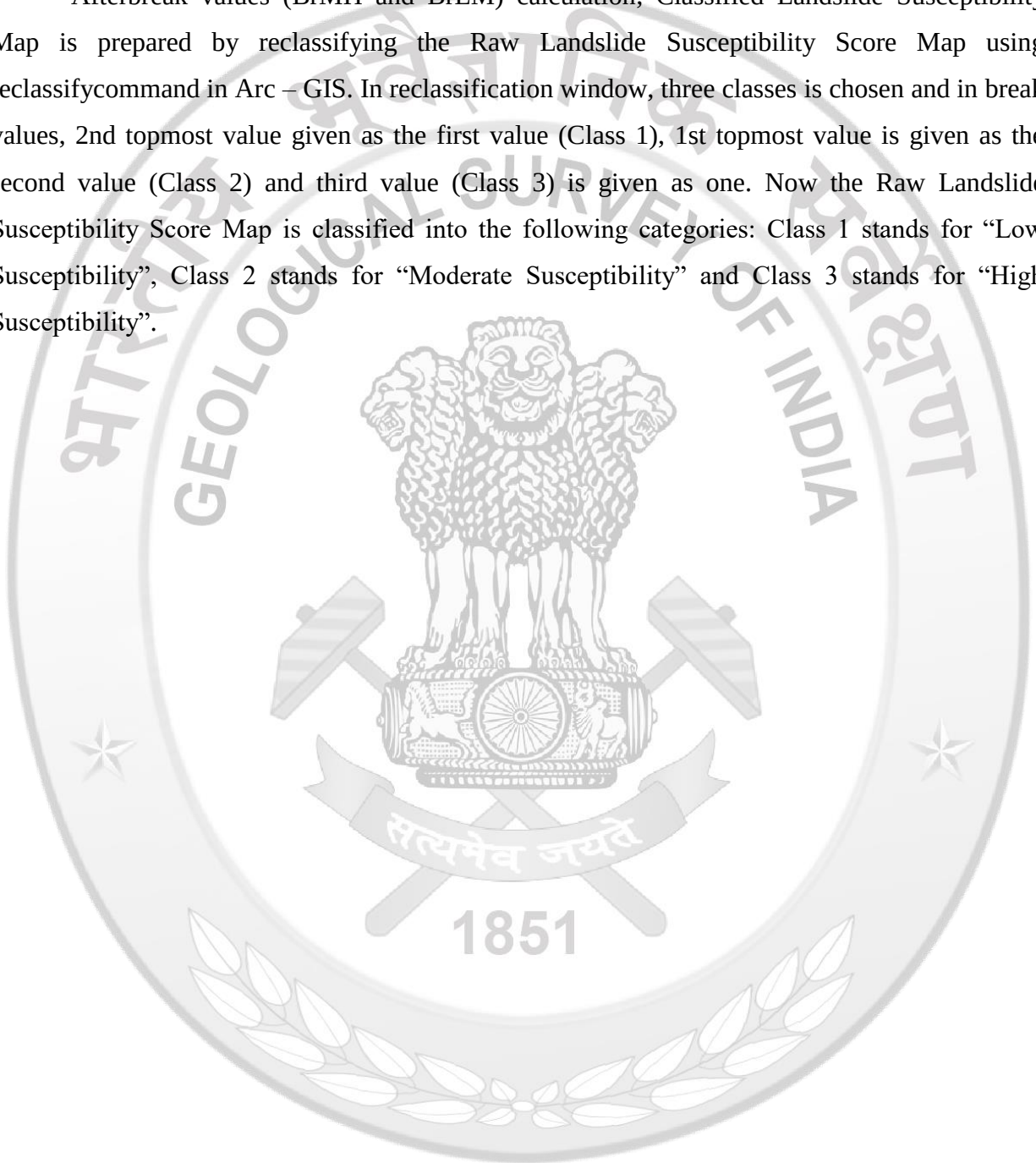
Susc Score = (LOFS_Factor1*weight of Factor1 + LOFS_Factor2*weight of Factor2 + LOFS_Factor3*weight of Factor3 + LOFS_Factorn*weight of Factor n) / Sum of inter – predictor weight.

In this type of knowledge-driven models, classification break values can be determined on the basis of the logic applied while giving mutual comparison expert driven ranking. It is always thought by any expert that rank value for any factor class is ≥ 5 , and it is considered that the particular factor class has higher likelihood in influencing the landslides. This rank value of “5” in a scale of “0” to “9” comes after 50% of the absolute difference values ($9-0 = 9$; 50% of 9 is 4.5). That is why this 50% cut-off margin or weightage can be used to determine the break raster value between “Moderate” and “High” susceptibility classes (BrMH). Similarly, when rank value for any factor class is ≤ 3 (lower than 30% of the absolute difference value of 9), and it is considered that the particular geofactor class has lesser likelihood in influencing any landslides. Accordingly, 30% cut-off margin or weightage can be used to determine the break values between “Low” and “Moderate” susceptibility classes (BrLM). Using the above logic the required break values can be determined by solving the following formula:

BrMH = [(Abs Diff LOFS Factor1*50)*weight of Fcator1 + (Abs Diff LOFS Factor2*50)*weight of Fcator2 + (Abs Diff LOFS Factor3*50)*weight of Fcator3 + (Abs Diff LOFS Factor n*50)*weight of Fcator n] / Sum of inter – predictor weight.

$$\text{BrLM} = [(\text{Abs Diff LOFS Factor1} \times 30) \times \text{weight of Fcator1} + (\text{Abs Diff LOFS Factor2} \times 30) \times \text{weight of Fcator2} + (\text{Abs Diff LOFS Factor3} \times 30) \times \text{weight of Fcator3} + (\text{Abs Diff LOFS Factorn} \times 30) \times \text{weight of Fcatorn}] / \text{Sum of inter – predictor weight.}$$

After break values (BrMH and BrLM) calculation, Classified Landslide Susceptibility Map is prepared by reclassifying the Raw Landslide Susceptibility Score Map using reclassifycommand in Arc – GIS. In reclassification window, three classes is chosen and in break values, 2nd topmost value given as the first value (Class 1), 1st topmost value is given as the second value (Class 2) and third value (Class 3) is given as one. Now the Raw Landslide Susceptibility Score Map is classified into the following categories: Class 1 stands for “Low Susceptibility”, Class 2 stands for “Moderate Susceptibility” and Class 3 stands for “High Susceptibility”.



5. LANDSLIDE SUSCEPTIBILITY MAP

Weighted Multiclass Index Overlay (WMIO) method was used to obtain the landslide susceptibility map (**Plate 5.1**) of TS nos. 48O/1, 48O/5 and 48N/8 which give the relative slope stability of the study area. The map provides fair idea of the slope susceptibility to failure of any type in response to the interaction of the considered geo-environmental factors.

In the current study only 0.25% of the total area is classed as highly susceptible. This accounts for about 4.06 km² of Toposheets 48O/1, 48O/5 and 48N/8. Moderately susceptible area accounts for 11.79% (190.71 km²) while low susceptible area accounts for 87.95 % (1421.84 km²).

As observed, the high susceptible area is very less in the study area. The high susceptible areas are mostly confined to the localized stretches of road sections and hill ranges. Similarly, the spatial distribution of moderately susceptible slopes is found associated with steep slopes and extensive slope cuts along road corridors. In addition, moderately susceptible slopes area also observed along the steep slopes of Vemalai Gudda, Balekal Gudda, Devara Gudda and Budi Gudda of toposheet no 48O/5 and Hittinavara AneGudde of toposheet no 48O/1. The low susceptible area accounting for 87.95 % (1421.84 km²) is primarily because about 90% of the area comes under slope angle 0°-15° which have minimum rating and therefore minimum Landslide Occurrence Favourability Score. And since the slope has the highest integer weight among all the themes considered in the study area, the low rated slope classes have higher influence to give low susceptibility to the slopes.

5.1 Susceptibility along Major Roads

The study area has small stretch of two major highways NH-206 in TS no 48N/8, NH-13 in TS no 48O/5. Three SH-1, 52, 77 are running in the study area. Both the highway are in gently undulating topography where the slope angle <15° and therefore these roads are largely stable. In Toposheet no 48N/8 during the field study not a single landslide documented along the road section. But few road cut failures observed along SH-52 and village link roads of toposheet no 48O/1 and 48O/5.

5.1.1 Hosanagara to Nagar Road Section

The road along this sector in TS No 48O/1 is flat or gently undulating topography where the slope is 0°-15° and therefore these roads are largely stable. However, localized stretches of road involve slope profile modification through extensive slope cut for road construction and

therefore the road stand moderately susceptible in isolated pockets. Certain pockets represent moderately steep slopes and when the slope cut intersect the weathered pockets of rock mass and poor slope forming derivative material, landslides have been initiated. A few landslides documented along the road section (SH-52) below Haniya to Hilkunji village is largely aggravated by slope cutting and incessant rainfall. In addition to that, along the village link road like Jakkannagadde to Hiregadde, Sonale to Yelladakoneslope cut failures are noticed. Scouring and erosion of the loose debris and insitu soil debris is observed along the village link road sections and can initiate small dimension landslides during adverse hydrological condition. Other than this Maskani to Bellururoad section of TS no 48O/5, patches of road section comes under moderate susceptible due to the presence of predisposing factors such as slope angle and lithology.

5.2 Susceptibility along Major Settlements

Given the fact that about 88% of the area fall in low susceptible zone the settlements in the study area lie in low susceptible area. The settlements of the study area are located either on the low lying area or gently undulating hill top. However in few villages settlements are made by profiling of the slope. Even $<15^\circ$ slope also converted into susceptible due to unscientific method of slope modification. During the field study no any major settlements comes under the susceptibility because of the settlements are located in the low lying area.

5.2.1 Settlements in Toposheet 48O/1

The major settlement in the TS No 48O/1 includes Hosanagar, Nagar, Ambutirtha, Konanduru, Hunchaand Koduruvillages all of which fall in low susceptible areas. No landslides have either been reported or documented in these villages during the study.

A host of other villages scattered across the study area in Toposheet 48O/1 include Malur, Hilkunji, Sonale, Hanja, Haniya, Chitrahalli, Jeni, Mumbaru, Melinabesige, Sutta, Adagadodur, Dodur, Kallugadde, Tenkabailu, Chakanagadde, Adagodu, Nonaburu, Hadigallu, Borikoppa, Trineve, Varambailli, Nagarahalli, Mavinakatte, Amrata, Kotetariga, Soppinamalli, Mavinakoppaetc. All these villages lie on the flat to lowly dissected rolling plain or lowly dissected hill slopes and come under low susceptible area. While no natural landslides have been reported within the villages, it is noteworthy to mention that anthropogenic influenced landslides within the villages cannot be ruled out in the future due to poor drainage maintenance, unmethodical extensive slope cut for settlements under a given set of adverse conditions. Other

than these villages, there are many small villages spread over the study area. Countable numbers of landslide documented adjacent to the cultivated land. In addition to that few numbers of small landslides are observed adjacent to the settlements, those settlements constructed by modifying the slope. The Malur village is located on top of the lowly dissected gently undulating topography. Adjacent to this village along the cultivation two major slides are seen and these slides are retrogressive in nature. In future the slide retrograde and brings the life and property in danger.

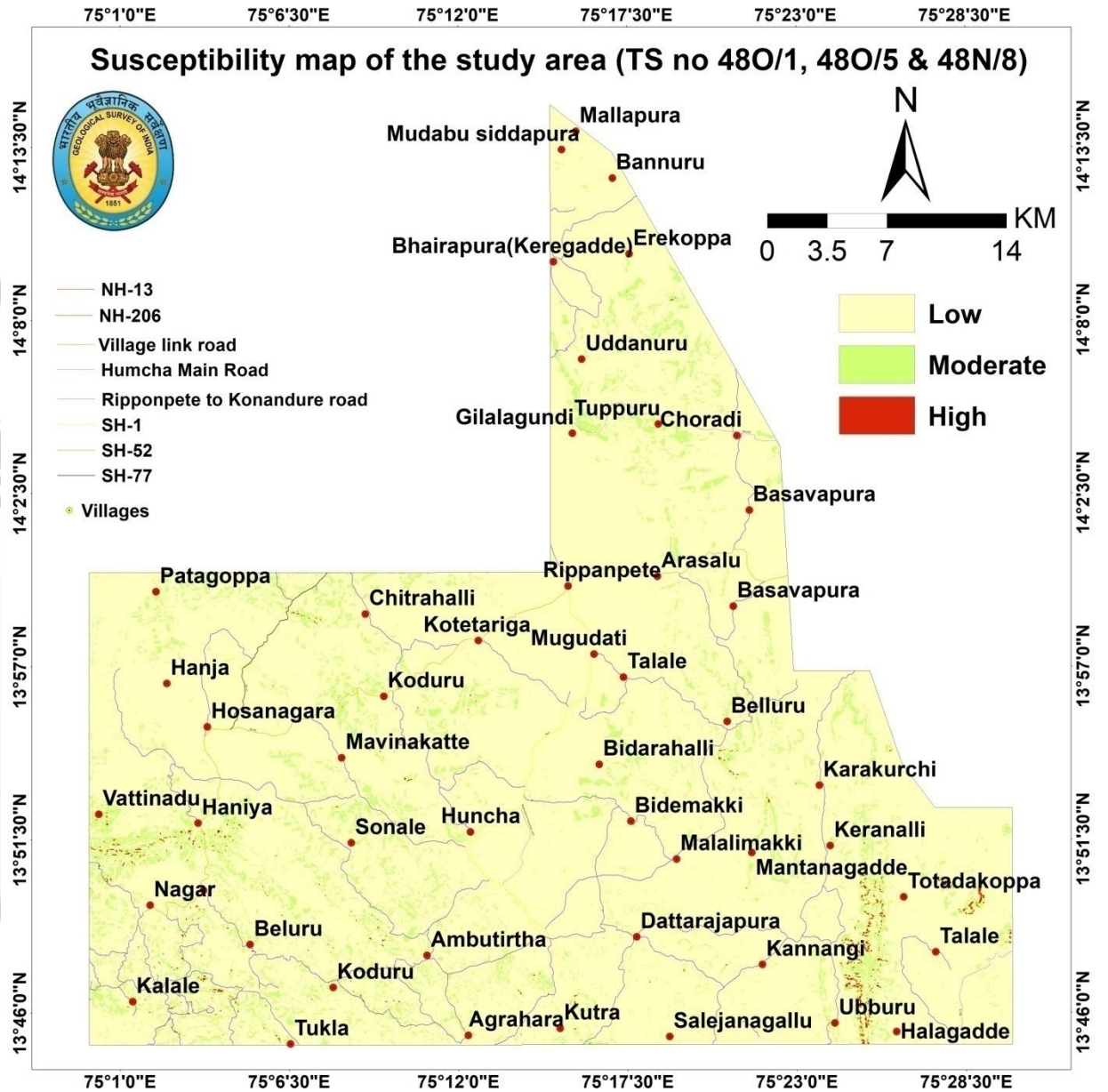
5.2.2 Settlements in Toposheet 48O/5

The major villages in the TS No 48O15 include Ripponpete, Arasalu, Mugudati, Belluru, Agrahara, Kuduvalli, Ubburu, Talale, Kananagi, Hanigeri, Kigadi, Jirigemane, Harahittalu and Basavapura villages. No landslides have been documented in these villages during the study. These villages are located in low susceptible zone in the map. The villages are situated in gentle topography and lowly dissected slopes. But around these villages adjacent/along the cultivation small soil slide and debris slide noticed. These small dimensional slope failures are occurring every year along the cultivated land during monsoon season due to excess water in the stream channel (toe cut) and hydrostatic pore-pressure increase in the soil however there is a considerable amount of anthropogenic activity also plays a vital role to initiate for these kinds of landslides.

However, given the varied nature of land use activity and the spatial variation in slope forming material, any unmethodical anthropogenic activity can aggravate landslides within the villages. The area consists of insitu soil as slope forming material and slope is gentle to moderate. Occasional debris and soil slides are expected to occur in these areas as granite gneiss is weathered and thick overburden is developed in all over the area.

The high percentage of low susceptibility in the area is primarily because of large area falling in low slope angle 0-15°. However, slope re-profiling are well-known anthropogenic activity that are performed for roads, infrastructures, mines and quarry, buildings, etc. These re-profiling of slopes even in apparently low slope angle are directly linked to a modification of the factor of safety of the slope. Therefore, the influence on slope stability through these dynamic activities of the people in isolated pockets over large area is difficult to be monitored or predicted individually.

Plate 5.1



6. CONCLUSIONS AND RECOMMENDATIONS

6.1 Summary

As the Western Ghats experience prolonged heavy rainfall which is an important factor in initiating several small landslides, the landslide susceptibility study calls for understanding the spatial and causal relationship of different pre-disposing factors with landslides. During the landslide susceptibility study for the given area, heuristic or knowledge driven approach is employed for want of adequate landslide incidences and non-uniform spatial distribution of landslides. Hence, the individual rating for geo-factor classes and weights of geo-factors are determined based on experience and field inputs and Landslide Occurrence Favourability Score for different relevant classes are derived using Analytical Hierarchy Process (AHP) after preparing the pairwise qualitative comparison matrix of all factors (Saaty, 1977).

In the current study five relevant pre-disposing factors viz. slope angle, land use and land cover (LULC), geomorphology, slope forming material (SFM) and regolith thickness maps were considered as input thematic maps in the landslide susceptibility model. The maps were integrated in GIS using weighted multiclass index overlay method to obtain the susceptibility score map.

The final susceptibility map on 1:50,000 is a qualitative map in which slopes have been classed into varying degrees of possible failure, in response to the interaction of the geo-environmental factors considered in the study. Landslide is a dynamic natural phenomenon in response to the interplay of several geo-environmental factors which vary in space and time. The relative terms such as low, medium and high susceptibility have been used to indicate the classified slopes categorically for susceptibility to initiation of landslides in a particular place.

In the study area, slope angle varies between 0° and 51° however, the slope angle 0° - 15° which has very low rating accounts for 89.73% of the total study area. This low angle area is essentially rolling plain and Pediment pediplain complex predominate and constitutes a highly stable area. But most of the small dimensional landslides (103) initiated in the 0 - 15° slope that clearly indicate anthropogenic activity influence.

Field observations show significant influence of anthropogenic activity in bringing about change in slope profile and making certain pockets susceptible. Extensive slope cuts observed to have initiated a few landslides along the road corridors. The upslope of such excavation is changed the natural slope profile and the slope turned into unstable. Given their dynamicity and

critical role in slope modification maximum rating of 7 and 9 has been assigned to settlement on modified slope and extensive slope cuts respectively. Amongst the geomorphology classes, the moderately dissected area covers 21.77% lowly dissected covers 29.51% and rolling covers 25.87% of the hill slopes. Given their considerable areal coverage and after studying their relative stability in the field, ratings of 6, 4 and 0 are assigned to these classes respectively. The study area largely is gently undulating landform and is essentially subdued rolling topography where the maximum slope angle ranges from 0° - 15° .

Slope forming material and its spatial distribution and also its thickness variation play a crucial role in causing different types of landslides. The spatial distribution of soil or overburden and its thickness is controlled by nature of bed rock, degree of weathering, erosion processes, and slope morphometry. About 16.65% study area exposes rock of different types which includes slopes having less than half a meter of overburden cover. Maximum area of about 66.24% is covered by insitu soil. Loose debris is invariably found associated along the slopes where extensive cutting and old slide area are carried out accordingly maximum rating of 8 is assigned to it.

The most of the slope failures identified in the area are confined to the extensive slope cut for roads or adjacent to the cultivation where modification of slope profile has taken place in the process. Besides these slides around 14 debris flow landslides are documented in the natural slope which is initiated during the 2019 Monsoon. Out of 144 landslides identified, there are 1 rock slide, 74 debris slides and 55 soil slides.

Besides ratings for different classes of the geo-factors the inter-predictor weight is also assigned for each geo-factor depending on the overall contributing role in slope failures. The least weight of 2 is assigned for curvature since the study area the concave and convex profile of slopes have similar but relatively less spatial relations with landslides in natural setting. Large part of study area represents gently undulating terrain (Rolling plain), moderately dissected slope, lowly dissected slope and constitutes relatively high role in slope failures and therefore geomorphology has been assigned a weight of 6. Similarly, regolith thickness has been given a weight of 4 taking into account the variation and spatial association of the regolith thickness with existing landslides.

The type of material comprising the slopes such as highly weathered rock, insitu soil and loose debris contribute to the overall slope instability in the study area and so a weight of 6 is

assigned for slope forming material. Amongst all the themes the land use pattern is the most dynamic in terms of slope modification and act as major causative factor and therefore a weight of 8 has been assigned for land use land cover. The maximum weight 9 is assigned for slope angle in the study area as it plays a significantly greater role in susceptibility of slope by way of having or providing an inherent causal relationship with instability. Any type of existing slope failures necessarily involve slope angle of certain degree.

In the current study only 0.25% of the total area is classed as highly susceptible. This accounts for about 4.06 km² of Toposheets 48O/1, 48O/5 and 48N/8. Moderately susceptible area accounts for 11.79% (190.71 km²) while low susceptible area accounts for 87.95 % (1421.84 km²).

The derived susceptibility map is on 1:50,000 scale and can be used for regional application. The map can aid planners and policy makers to acquire perspective understanding of the potential landslide prone areas and therefore to evaluate the regional relative stability of slopes before and during the course of constructing civil structures.

6.2 Limitations

The generated landslide susceptibility map is largely valid under the given set of geo-environmental conditions existent at the time of the study (slope conditions used as input in the susceptibility modelling). Any significant change in the spatial distribution of the geo-environmental factors can affect the susceptibility of the area.

Field validation of the geo-parametric attributes of the study area is an integral part of the susceptibility analysis. However, the inaccessibility to certain sectors due to steep nature of the terrain brings about limitations in terms of uncertainty in few geo-parametric attributes.

Heuristic or knowledge driven method which is employed in the current susceptibility modelling and mutual pair wise comparison of classes through Analytical Hierarchy Process comes with certain limitation. This process caters to the terrain specific needs; however, there is always an inclination for unintended biasness in the ratings assigned. Therefore, earnest attempt has been made to minimize biasness in assigning ratings to various factor classes and also factor weight for each theme through mutual discussion and re-assessment through field inputs.

The susceptibility map gives estimation that the mapping unit will be affected by a potential future landslide. However, it may be categorically mentioned that the future landslide does not refer to any specific time frame or frequency of occurrence nor does it carry any

connotation on the magnitude or scale of the failure. It is known that factors like antecedent rainfall, erodability of the drainages, large scale anthropogenic interferences are also equally important in inducing instability in this area. Therefore, locally, the present susceptibility status of the existing slope may undergo significant changes due to the effect of the above mentioned factors.

It is merely an establishment of relationship of relevant geo-environmental causative factors with landslides for the areas of interest and based on which a qualitative assessment has been reached with regard to their stability.

6.3 Recommendations

Major part of the study area falls in low susceptible slopes. However, mitigation measures around susceptible areas along a few stretches of communication corridors need to be considered. The studies and analysis of the existing baseline information of landslide inventory data and field observations suggest that anthropogenic activity has relatively more significant influence in inducing instability of the slope mass.

The study of cumulative landslide inventory has established that landslides in the study area are triggered mostly by prolonged or heavy rain as the state receives high rainfall. After consideration of the relevant geo-factors in determining the initiation and the spatial distribution of landslides the following generic recommendations are given:

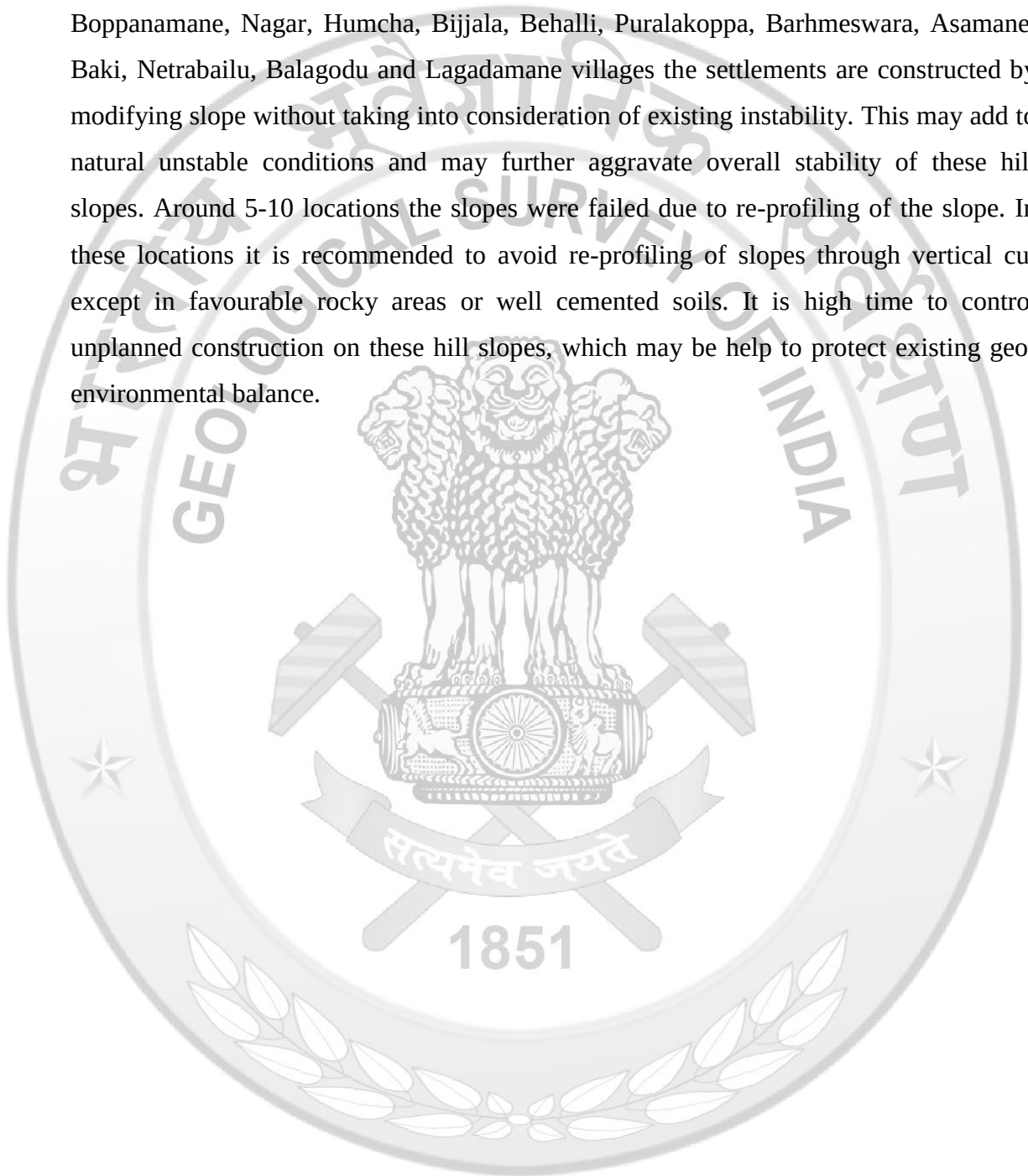
- Slope profile modification during road excavation is found to be a primary aggravating factor for inducing local instability. Hill slopes currently classified in low to moderate susceptibility are anticipated to increase to high susceptibility status when subjected to extreme anthropogenic interference without methodical approach in the near future. Under such circumstances any attempt to widen the existing roads or raise civil structures of importance on the slopes must consider the site specific suitability and criticality of the slope.
- In this respect, the road stretch from Haniya-Nagar sections is apparently self-supporting and stable owing to exposure of the quartz-chlorite schist and gneissic rock, yet few road cut failures are observed. However, in the process of road widening, slope profile modification can make the slopes critical. Therefore, any attempt to widen the road must consider grading or easing the slope angle. In addition, the weathered pockets of rock mass exposed along the upslope of

Haniya-Nagar sections must be considered. Several rock boulders, jointed rock and thick insitu soil in the vertical slope are observed along the stretch. Loose dislodged blocks of rocks are precariously disposed on the steep slopes above the road which have the potential to topple and fall. It is therefore recommended for scaling of the vulnerable and unstable rock blocks wherever accessible.

- Many villages in the study area were visited during the study, appear to be stable but small dimension recurrent landslide occurred adjacent to the cultivation during the rainy season between the hill and valley side. Most of the soil slide initiated in vicinity to the cultivation due to the predisposing factors such as presence of thick overburden in the vertical slope which leads to soil slide in the event of super-saturation under adverse hydrological condition. In such locations it is recommended that easing of slope, and lining of drainage. Bioengineering techniques are useful tools to prevent landslides as they improve slope stability and maintain ecological balance. However, a successful bioengineering technique in those areas requires more scientific research and a good understanding of the factors that influence its effectiveness. Fascines, palisades, brush layering, brushwood check dams, wattling, loose stone check dams, vegetative rip-rap, and grass planting are effective bioengineering methods to prevent the landslides.
- Most of the roads pass through the gently undulating topography, like NH-13, NH-206 and some SH. Fresh slope cutting for road construction or widening of existing road must necessarily be accompanied by lined hillside drainage and construct adequate number of culverts. In the study area village link roads are constructed by disturbing the toe. Along those road sections, the height of the slope is less and small scale slumps are noticed. Few village link roads like Nigilavani to Mavinahakkal. Ittiki to Hiregadde, Jakkanagadde to Mattige, Arodi to Sankodikoppa, Shilekuni to Kuduvalli and Hanigri to Kuduvalli roads are newly constructed over cut and filled material without any weightage to engineering consideration. No construction of structures should be allowed on the dumped debris material. The susceptible road stretches, particularly along SH-52- Hosanagara to Nagar road section, must have suitably designed breast walls, depending on the height of the slopes and the material that constitute the slope. Adequate weep holes must be provided at the same time. Landslides of smaller dimensions landslides with differential movement of slope mass were documented along this section for which

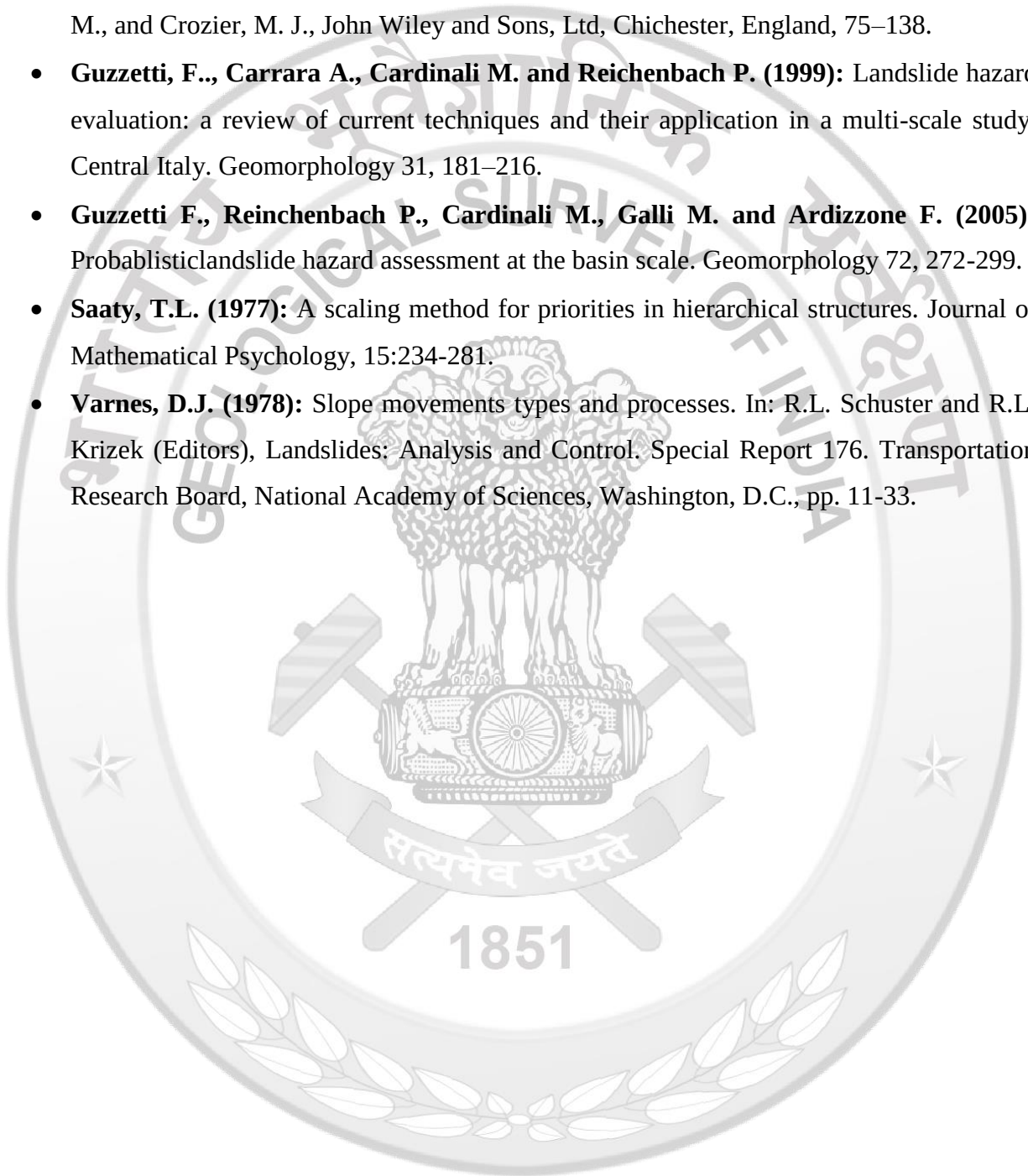
gabion wall with proper hillside drainage should provide a simple and cost effective solution.

- During the field visit it is observed that in many locations like Sankodikoppa, Boppanamane, Nagar, Humcha, Bijjala, Behalli, Puralakoppa, Barhmeswara, Asamane, Baki, Netrabailu, Balagodu and Lagadamane villages the settlements are constructed by modifying slope without taking into consideration of existing instability. This may add to natural unstable conditions and may further aggravate overall stability of these hill slopes. Around 5-10 locations the slopes were failed due to re-profiling of the slope. In these locations it is recommended to avoid re-profiling of slopes through vertical cut except in favourable rocky areas or well cemented soils. It is high time to control unplanned construction on these hill slopes, which may be help to protect existing geo-environmental balance.



REFERENCES

- **Glade, T. and Crozier, M. J. (2005):** A review of Scale Dependency in Landslide Hazard and Risk Analysis, in Landslide Hazard and Risk, edited by: Glade, T., Anderson, M., and Crozier, M. J., John Wiley and Sons, Ltd, Chichester, England, 75–138.
- **Guzzetti, F., Carrara A., Cardinali M. and Reichenbach P. (1999):** Landslide hazard evaluation: a review of current techniques and their application in a multi-scale study, Central Italy. *Geomorphology* 31, 181–216.
- **Guzzetti F., Reichenbach P., Cardinali M., Galli M. and Ardizzone F. (2005):** Probabilistic landslide hazard assessment at the basin scale. *Geomorphology* 72, 272-299.
- **Saaty, T.L. (1977):** A scaling method for priorities in hierarchical structures. *Journal of Mathematical Psychology*, 15:234-281.
- **Varnes, D.J. (1978):** Slope movements types and processes. In: R.L. Schuster and R.L. Krizek (Editors), *Landslides: Analysis and Control*. Special Report 176. Transportation Research Board, National Academy of Sciences, Washington, D.C., pp. 11-33.



LOCALITY INDEX

Location	Latitude	Longitude	TS No.
Adagadodur	13° 47' 49.79"	75° 03' 21.88"	48O/1
Adagodu	13° 45' 44.31"	75° 12' 55.18"	48O/1
Agrahara	13° 45' 18.3"	75° 12' 21.12"	48O/1
Alagaru	13° 52' 46.39"	75° 8' 26.13"	48O/1
Alase	13° 50' 53.43"	75° 21' 46.37"	48O/5
Ambutirtha	13° 47' 47.99"	75° 10' 58.61"	48O/1
Amrata	13° 53' 29.38"	75° 14' 21.19"	48O/1
Anegadde	13° 51' 14.21"	75° 10' 10.12"	48O/1
Arasalu	13° 59' 52.19"	75° 18' 29.14"	48O/5
Arodi	13° 51' 5.35"	75° 3' 44.49"	48O/1
Asamane	13° 46' 16.06"	75° 2' 31.88"	48O/1
Ayanuru	14° 1' 36.76"	75° 26' 14.99"	48N/8
Baise	13° 49' 23.38"	75° 0' 16.3"	48O/1
Baki	13° 46' 29.96"	75° 5' 22.31"	48O/1
Balekal Gudda	13° 49' 25.18"	75° 28' 32.05"	48O/5
Balekoppa	13° 53' 15.58"	75° 2' 15.99"	48O/1
Balishettikoppa	13° 55' 13.34"	75° 9' 42.97"	48O/1
Bannuru	14° 12' 35.71"	75° 16' 56.13"	48N/8
Basavapura	13° 58' 55.02"	75° 20' 58.44"	48O/5
Behalli	13° 54' 25.78"	75° 8' 43.27"	48O/1
Belluru	13° 55' 23.60"	75° 20' 41.91"	48O/5
Beluru	13° 48' 14.14"	75° 5' 15.58"	48O/1
Bhairapura (Keregadde)	14° 9' 49.38"	75° 15' 09.01"	48N/8
Bidarahalli	13° 53' 51.82"	75° 16' 33.88"	48O/5
Bidemakki	13° 52' 05.20"	75° 17' 35.58"	48O/5
Bijjala	13° 47' 36.47"	75° 12' 04.60"	48O/5
Billive Hariharapura	13° 45' 04.18"	75° 16' 41.99"	48O/5
Bisilamane	13° 47' 7.16"	75° 20' 15.4"	48O/5
Bolakoppa	13° 48' 19.2"	75° 2' 2.88"	48O/1
Boppanamane	13° 51' 20.58"	75° 0' 5.36"	48O/1
Borikoppa	13° 50' 50.05"	75° 8' 7.99"	48O/1
Brahmanweda	13° 50' 28.72"	75° 0' 16.75"	48O/1
Brahmeswara	13° 57' 4.04"	75° 5' 3.5"	48O/1
Budi Gudda	13° 50' 16.94"	75° 22' 30.19"	48O/5
Charodi	14° 4' 23.38"	75° 21' 4.33"	48N/8
Chakanagadde	13° 46' 4.23"	75° 14' 24.99"	48O/1
Chitrahalli	13° 58' 44.52"	75° 8' 47.24"	48O/1
Dattarajapura	13° 48' 24.77"	75° 17' 48.66"	48O/5
Devagange	13° 50' 33.82"	75° 1' 34.78"	48O/1

Devaragudda	13° 50' 6.99"	75° 28' 56.07"	48O/5
Dodur	13° 46' 57.48"	75° 2' 58.61"	48O/1
Dombesara	13° 48' 19.37"	75° 19' 49.7"	48O/5
Ebbegodu	13° 50' 9.91"	75° 0' 33.2"	48O/1
Edanala	13° 45' 26.44"	75° 4' 8.42"	48O/1
Erekoppa	14° 1' 2.5"	75° 29' 34.01"	48N/8
Gilalagundi	14° 4' 16.52"	75° 15' 50.76"	48N/8
Goragal	13° 52' 9.46"	75° 5' 39"	48O/1
Guddekoppa	13° 46' 23.03"	75° 14' 28.48"	48O/1
Handyalakoppa	13° 53' 6.77"	75° 6' 12.41"	48O/1
Halasuvala	13° 46' 09.52"	75° 27' 02.58"	48O/5
Hanigeri	13° 50' 49.95"	75° 27' 24.54"	48O/5
Haniya	13° 52' 0.46"	75° 3' 32.82"	48O/1
Hanja	13° 56' 23.61"	75° 2' 39.11"	48O/1
Harohittalu	13° 57' 44.07"	75° 20' 23.58"	48O/5
Hanukoppa	13° 47' 21.39"	75° 11' 25.63"	48O/1
Harekoppa	13° 55' 33.64"	75° 11' 1.77"	48O/1
Harnahalli	14° 2' 24.7"	75° 28' 6.01"	48N/8
Hebballi	13° 52' 31.35"	75° 21' 52.61"	48O/5
Hegalathi	13° 49' 16.87"	75° 25' 59"	48O/5
Heggebailu	13° 46' 39.86"	75° 5' 45.39"	48O/1
Hilkunji	13° 49' 33.04"	75° 4' 4.64"	48O/1
Hiregadde	13° 47' 59.05"	75° 8' 22.85"	48O/1
Hirinagadde	13° 47' 4.74"	75° 2' 40.98"	48O/1
Hittinavara Ane Gudde	13° 51' 3.66"	75° 1' 14.74"	48O/1
Hondalagadde	13° 52' 17.42"	75° 12' 46.1"	48O/1
Hosagadde	13° 50' 33.35"	75° 10' 25.02"	48O/1
Hosanagara	13° 55' 2.90"	75° 3' 49.13"	48O/1
Hosatota	13° 46' 45.82"	75° 14' 17.09"	48O/1
Humachadakatte	13° 52' 32.74"	75° 14' 2.95"	48O/1
Huncha	13° 51' 45.48"	75° 12' 23.24"	48O/1
Huligaru	13° 54' 33.26"	75° 9' 31.84"	48O/1
Hulisara	13° 50' 4.31"	75° 9' 31.77"	48O/1
Ittiki	13° 49' 28.22"	75° 6' 53.51"	48O/1
Jaddinagadde	13° 47' 46.81"	75° 19' 19.28"	48O/5
Jakkanagadde	13° 51' 40.40"	75° 4' 39.90"	48O/1
Jamballi	13° 50' 44.4"	75° 10' 40.18"	48O/1
Jeni	13° 58' 33.58"	75° 3' 44.35"	48O/1
Jirigemane	13° 54' 34.15"	75° 17' 50.45"	48O/5
Kachigebail	13° 59' 03.99"	75° 06' 38.67"	48O/1
Kadasuru	13° 52' 22.37"	75° 11' 19.17"	48O/1

Kalase	13° 55' 44.86"	75° 19' 39.35"	48O/5
Kalavatti	13° 47' 29.56"	75° 20' 38.09"	48O/5
Kalkankoppa	13° 55' 36.59"	75° 10' 29.13"	48O/1
Kannangi	13° 47' 27.85"	75° 21' 54.72"	48O/5
Karakurchi	13° 53' 17.06"	75° 23' 43.36"	48O/5
Karugodu	13° 55' 40.01"	75° 11' 54.61"	48O/1
Kaudalli	13° 45' 41.04"	75° 16' 47.55"	48O/5
Kavatamane	13° 45' 58.43"	75° 18' 52.12"	48O/5
Kigadi	13° 49' 0.85"	75° 27' 51.18"	48O/5
K. Kunnuru	13° 54' 49.54"	75° 10' 58.5"	48O/1
Kodase	13° 50' 38.01"	75° 3' 5.84"	48O/1
Koduru	13° 55' 59.46"	75° 9' 36.71"	48O/1
Koduru Tenkabailu	13° 47' 4.01"	75° 7' 22.23"	48O/1
Konanduru	13° 48' 51.39"	75° 14' 31.39"	48O/1
Kotehalli	13° 46' 40.35"	75° 16' 12.75"	48O/5
Kotetariga	13° 57' 12.88"	75° 13' 06.75"	48O/1
Kuduvalli	13° 45' 43.53"	75° 21' 20.82"	48O/5
Kumsi	14° 3' 19.52"	75° 23' 53.48"	48N/8
Kunnuru	13° 55' 8.43"	75° 10' 52.1"	48O/1
Kutra	13° 45' 26.42"	75° 15' 8.18"	48O/5
Lagadamane	13° 48' 22.67"	75° 09' 21.89"	48O/1
Makeri	13° 50' 17.28"	75° 23' 45.83"	48O/5
Malaimakki	13° 50' 53.58"	75° 19' 7.88"	48O/5
Maleshankara Gudi	13° 55' 50.69"	75° 25' 20.85"	48O/5
Mallapura	14° 14' 00.50"	75° 15' 50.53"	48N/8
Malur	13° 53' 39.98"	75° 10' 39.89"	48O/1
Manninakoppa	13° 58' 37.24"	75° 3' 37.96"	48O/1
Maskani	13° 53' 00.36"	75° 20' 06.92"	48O/5
Mattige	13° 50' 14.59"	75° 8' 4.71"	48O/1
Mavinahakkal	13° 46' 23.49"	75° 4' 03.40"	48O/1
Mavinakatte	13° 54' 5.87"	75° 8' 12.68"	48O/1
Mavinakoppa	13° 55' 5.95"	75° 4' 52.26"	48O/1
Melinabesige	13° 53' 30.41"	75° 4' 17.023"	48O/1
Mudali	13° 49' 47.35"	75° 10' 10.25"	48O/1
Mudalumane	13° 50' 38.76"	75° 27' 40.45"	48O/5
Muduba Siddapura	14° 13' 29.02"	75° 15' 13.48"	48N/8
Mugudati	13° 57' 24.53"	75° 16' 29.08"	48O/5
Mulisara	13° 51' 56.83"	75° 24' 07.33"	48O/5
Mumbaru	13° 55' 24.76"	75° 6' 32.71"	48O/1
Mutturu	13° 55' 58.33"	75° 8' 11.7"	48O/1
Nagara	13° 49' 29.122"	75° 15' 7.43"	48O/1

Nagarahalli	13° 49' 49.91"	75° 11' 34.3"	48O/1
Nagarakudige	13° 51' 18.03"	75° 06' 06.83"	48O/1
Nerale	13° 47' 46.64"	75° 9' 10.25"	48O/1
Netrabailu	13° 50' 22.81"	75° 0' 43.99"	48O/1
Nigilavani	13° 46' 52.12"	75° 3' 57.32"	48O/1
Nonaburu	13° 47' 48.96"	75° 11' 10.83"	48O/1
Patagoppa	13° 59' 24.01"	75° 2' 9.82"	48O/1
Puralakoppa	13° 47' 08.62"	75° 21' 35.34"	48O/5
Puttalikoppa	13° 45' 45.52"	75° 14' 43.29"	48O/1
Ravemane	13° 48' 49.03"	75° 3' 58.5"	48O/1
Ripponpete	13° 59' 31.79"	75° 15' 34.8"	48O/5
Salejanagallu	13° 45' 16.25"	75° 18' 55.31"	48O/5
Sampemane	13° 51' 51.70"	75° 3' 00.71"	48O/1
Sattodi	13° 53' 11.49"	75° 9' 15.38"	48O/1
Shankarahalli	13° 50' 21.11"	75° 12' 54.48"	48O/1
Shilekuni	13° 47' 00.42"	75° 21' 20.82"	48O/5
Sonale	13° 51' 23.02"	75° 8' 28.83"	48O/1
Soppinamalli	13° 59' 04.96"	75° 8' 47.05"	48O/1
Sunkal	13° 53' 42.89"	75° 11' 19.94"	48O/1
Surugodu	13° 49' 7.19"	75° 3' 23.21"	48O/1
Sutta	13° 47' 51.71"	75° 0' 18.03"	48O/1
Talale	13° 56' 39.71"	75° 17' 21.55"	48O/5
Talanari	13° 50' 55.19"	75° 6' 55.58"	48O/1
Talluru	13° 46' 54.91"	75° 13' 52.92"	48O/1
Taragoli	13° 45' 38.66"	75° 14' 26.76"	48O/1
Tenkabailu	13° 54' 12.81"	75° 2' 11.87"	48O/1
Torebailu	13° 50' 29.01"	75° 17' 40.15"	48O/5
Tottadakoppa	13° 49' 34.98"	75° 26' 9.21"	48O/5
Tippuru	14° 4' 43.29"	75° 18' 29.93"	48N/8
Trineve	13° 51' 30.84"	75° 5' 39.62"	48O/1
Tukla	13° 45' 0.77"	75° 6' 13.45"	48O/1
Ubburu	13° 45' 38.89"	75° 24' 13.37"	48O/5
Uddanuru	14° 6' 43.86"	75° 16' 02.58"	48N/8
Varamballi	13° 52' 41.58"	75° 6' 51.21"	48O/1
Vattinadu	13° 52' 17.84"	75° 0' 19.33"	48O/1
Vemalai Gudda	13° 51' 15.92"	75° 24' 24.39"	48O/5
Yelladakone	13° 51' 35.61"	75° 9' 52.09"	48O/1

Annexure-I Rainfall data of Hosanagara Taluk (2009- 8 th Nov2019)

Year 2009

Taluk	JAN	FEB	MAR	APR	MAY	JUN	JULY	AUG	SEP	OCT	NOV	DEC	Annual R.F.
Hosanagar	0	0	77.9	23.5	208.5	198.3	2501.1	373.0	473.9	152.0	127.9	7.9	8280.1
Hosanagar	0	0	75.9	34.5	172.9	134.0	1663.0	232.0	305.3	156.6	108.5	2.5	5768.0
Hosanagar	0	0	56.5	15.0	143.5	128.0	1033.8	181.6	237.0	118.0	64.7	9.1	3965.4
Hosanagar	0	0	49.4	21.5	159.5	353.0	2268.6	519.6	173.0	277.8	144.0	18.0	7950.7

Year 2010

Taluk	JAN	FEB	MAR	APR	MAY	JUN	JULY	AUG	SEP	OCT	NOV	DEC	Annual R.F.
Hosanagar	11.5	0	0	79.0	73.5	95.8	83.8	149.5	89.3	113.0	27.0	5.0	1417.3
Hosanagar	22.5	0	0	96.2	76.5	66.5	54.0	142.9	72.5	99.5	46.3	2.3	1417.9
Hosanagar	11.0	0	0	59.1	158.0	123.5	75.2	270.5	142.6	109.5	98.5	1.5	1966.6
Hosanagar	11.2	0	0	99.2	28.7	119.5	69.0	218.3	85.2	94.1	31.0	2.3	1626.3

Year 2011

Taluk	JAN	FEB	MAR	APR	MAY	JUN	JULY	AUG	SEP	OCT	NOV	DEC	Annual R.F.
Hosanagar	0	0.0	14.5	73.5	41.0	541.8	882.5	684.9	591.7	77.1	42.8	0.3	5900.0
Hosanagar	0	0.0	0.0	76.5	62.0	521.3	787.5	462.8	472.3	107.7	55.5	0	5091.2
Hosanagar	3	0.2	4.5	158.0	85.5	302.4	388.5	296.4	243	173.7	55.4	0.5	3421.7
Hosanagar	0	0.0	2.0	28.7	13.0	581.4	1233.5	963.1	644.2	115.7	48.8	1.7	7262.5

Year 2012

Taluk	JAN	FEB	MAR	APR	MAY	JUN	JULY	AUG	SEP	OCT	NOV	DEC	Annual R.F.
Hosanagar	1.4	0	0.3	111	9.5	360.8	400	866.9	274.1	71	103.7	5.1	4402.6
Hosanagar	0.6	0	0.0	44	4.3	251.7	439	727.7	242.8	51	106.8	0.5	3735.5
Hosanagar	0.5	0	0.0	55	12	100.5	180	316.7	117.7	58	78	0.4	1838.0
Hosanagar	4.2	0	2.6	46	11.6	607.3	899	1695	334.7	101	109.2	1.8	7622.6

Year 2013

Taluk	JAN	FEB	MAR	APR	MAY	JUN	JULY	AUG	SEP	OCT	NOV	DEC	Annual R.F.
Hosanagar	2.5	18.2	6.2	27.6	45.8	582.1	1535.6	691.9	253.2	92.7	32.3	11.0	3298.83
Hosanagar	0.3	20.5	4.8	64.3	52.8	675.4	1444.9	615.1	234.5	117.2	11.0	0.2	3241.04
Hosanagar	0.4	10.8	3.7	31.0	35.2	260.9	752.7	232.6	173.9	80.0	10.8	3.2	1595.19
Hosanagar	1.6	11.3	4.9	26.3	64.7	1272.1	2348.5	864.4	356.8	162.0	32.9	5.0	5150.24

Year 2014

Taluk	JAN	FEB	MAR	APR	MAY	JUN	JULY	AUG	SEP	OCT	NOV	DEC	Annual R.F.
Hosanagar	0.9	19.5	1.9	15.9	69.8	430.9	1396.5	878.3	437.7	93.2	4.8	40.0	3389.3
Hosanagar	0.3	7.5	0.2	42.8	127.3	314.1	1092.3	651.6	275.1	93.2	5.1	19.0	2628.4
Hosanagar	0.1	6.0	11.9	55.5	69.7	121.2	533.1	440.9	191.8	125.3	5.5	6.3	1567.2
Hosanagar	0.6	0.2	0.1	9.7	86.9	684.4	2046.5	1273.3	601.6	128.1	24.3	34.7	4890.4

Year 2015

Taluk	JAN	FEB	MAR	APR	MAY	JUN	JULY	AUG	SEP	OCT	NOV	DEC	Annual R.F.
Hosanagar	0.6	0.2	6.1	63.2	98.5	567.8	465.6	325.7	233.1	77.3	71.6	1.2	1910.7
Hosanagar	0.5	0.1	25.3	51.0	160.6	730.1	334.8	256.6	154.3	103.2	88.4	0.7	1905.4
Hosanagar	0.4	0.0	28.2	78.0	158.1	450.3	234.4	188.2	142.1	108.0	75.6	0.6	1463.8
Hosanagar	1.6	0.0	10.5	25.6	93.8	1042.1	949.9	641.7	253.4	168.7	55.0	0.8	3243.2

Year 2016

Taluk	JAN	FEB	MAR	APR	MAY	JUN	JULY	AUG	SEP	OCT	NOV	DEC	Annual R.F.
Hosanagar	2.1	0.1	3.2	0.2	86.2	372.0	511.9	306.3	133.6	54.6	7.3	4.6	1482.1
Hosanagar	0.8	0.0	0.9	0.7	80.6	332.0	556.6	247.0	111.2	29.9	15.9	3.3	1378.7
Hosanagar	1.1	0.2	0.3	2.1	83.2	252.0	305.3	164.6	88.9	34.1	30.3	5.7	967.6
Hosanagar	1.8	0.5	2.6	5.5	112.0	745.1	1106.4	881.3	251.0	76.8	6.6	2.6	3192.1

Year 2017

Taluk	JAN	FEB	MAR	APR	MAY	JUN	JULY	AUG	SEP	OCT	NOV	DEC	Annual R.F.
Hosanagar	0.1	0.1	0.3	2.12	68.9	560.4	620.5	461.1	213.6	93.87	9.8	4.07	2035.0
Hosanagar	0	0.1	13	3.88	104	434.4	610.7	415.9	209.7	97.94	15.4	1.13	1906.3
Hosanagar	0.2	0	9.4	9.18	76.4	310.1	303.7	267.1	186.8	91.34	7.55	0.65	1262.5
Hosanagar	0.4	0.8	1.7	1.84	99.9	958.3	1233	972.4	322.9	114	28.2	5.92	3739.2

Year 2018

TALUK	(1st June to 30th September)	OCT	NOV	DEC	Annual R.F.
Hosanagr	2650	169	47	11	3041

Year 2019

TALUKNAME	JAN	FEB	MAR	APR	MAY	JUN	JULY	AUG	SEP	OCT	UPTO 8TH NOV
Hosanagar	0	0	0.5	3.5	5.5	348	1203.5	1666	793.9	304	11.5
Hosanagar	0.6	0	1.5	1.3	1	671	1498.6	2112	661.1	492.4	20.8
Hosanagar	0	0	5	1.5	5.5	199	492	877.5	278	330.5	12
Hosanagar	0	0	1	28.5	0	186	470	865.5	303.3	459	2
Hosanagar	0	3	8.5	14.5	0	347	1203.5	1661	780	325.5	37
Hosanagar	0	0	0.5	10	5.5	296	937	1636	791.9	330.5	12
Hosanagar	2	3.5	1	4	1.5	219	815.5	1819	742.5	407	32.5
Hosanagar	0	0	0.5	55.5	4	174	651.5	1389	413.5	419	54.5
Hosanagar	0	2	2.5	26	0.5	340	1131	1830	792.5	290	41
Hosanagar	0	0	2	10.5	3.5	393	1247	1818	803.5	278	25
Hosanagar	0	0	4.5	60	6.5	141	465	837.5	347.4	380	40.5
Hosanagar	0	0	4.5	0	0	105	699.5	1230	414	343.5	11
Hosanagar	0	3	8.5	14.5	0	444	1375.5	1866	829.5	338.5	37
Hosanagar	0	0	15.5	25	8.5	142	351	775.5	215	361.5	4
Hosanagar	0.7	0.8	0.7	39.1	2	284	415.1	883	237.3	671.9	2.2
Hosanagar	0	0	12.5	36.5	14.5	77	222	668	169	265	3
Hosanagar	0	0	21.5	54	5	161	293	754.5	276.9	337	3.5
Hosanagar	0	0	4.5	0	0.5	112	515	820	290.4	284.5	3
Hosanagar	1.5	0	12.5	19.5	2	173	353.6	745	272	663.4	3.2
Hosanagar	0	0	0	11.5	0	93.5	436.5	929	256.5	320.5	31
Hosanagar	0	0	15.5	25	8.5	133	304.5	667	177.5	346.5	3.5
Hosanagar	0	0	0.5	4	1	556	1614.5	2154	920	451.5	12.5
Hosanagar	1.9	1.4	0.9	23.3	57.1	1360	2602.8	2218	1138	480.1	13.2
Hosanagar	0.9	0.2	4.3	9.2	10.6	594	1614	2014	1030	537.8	7.8
Hosanagar	0.8	9.6	5.8	0	0	667	1596	2522	1100	718.4	56.4
Hosanagar	0	0	4	16	1.5	518	1569.8	1949	971.6	492.3	5.5
Hosanagar	0	0	0	13	4	537	1447	1827	969.5	377.5	7
Hosanagar	0	0	0	20	7.5	542	1559.5	1928	922	385	7.5
Hosanagar	0	0.2	5.5	2.5	1.5	671	1421.1	2225	688.4	493.5	11.5

Annexure-II Landslide Inventory 42-point proforma

1	Slide No.	KAR/SG/48O5/2019/01
2	Latitude (N)	13.7749
3	Longitude (E)	75.2694
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/5
7	Name of the slide	Kotehalli
8	NH/SH/Locality	Locality- Kotehalli
9	Length (m)	7
10	Width (m)	15
11	Height (m)	5
12	Area (m)	105
13	Depth (m)	0.5
14	Volume (m)	52.5
15	Run out distance (m)	Nil
16	Type of Material	Soil
17	Type of movement	Slide
18	Rate of movement	Rapid
19	Activity	Active
20	Distribution	Widening
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Lowly dissected slope
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	Moderate vegetation
28	Hydrological condition	Damp
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Forest
36	Geo-scientific Causes	Incessant rainfall lead to increase of the pore water pressure in the soil and toe cut by the flowing stream.
37	Remedial measures	Cleaning of the slide material and make the stream to flow in its original path.slope grading and planataions on the slope are also recommended.
38	Remarks, if any	Nil

39	Summary/Abstract	The slide happened due to the incessant rainfall. The predisposing factors are presence of weak slope forming material and drainage condition.
40	Date of Reporting	15-10-2019
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	2
1	Slide No.	KAR/SG/48O5/2019/02
2	Latitude (N)	13.782
3	Longitude (E)	75.2727
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/5
7	Name of the slide	Kotehalli 1
8	NH/SH/Locality	Locality- Kotehalli
9	Length (m)	10
10	Width (m)	35
11	Height (m)	8
12	Area (m)	350
13	Depth (m)	1
14	Volume (m)	350
15	Run out distance (m)	Nil
16	Type of Material	Soil
17	Type of movement	Slide
18	Rate of movement	Rapid
19	Activity	Active
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Lowly dissected hills
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	High height plantation
28	Hydrological condition	Damp
29	Triggering Factor	Rainfall/Anthropogenic
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Agriculture
36	Geo-scientific Causes	Incessant rainfall leads to increase of the pore water pressure in the soil and toecut by the flowing stream. The slope was modified for plantation and construction of the road.
37	Remedial measures	Clean the fallen slide material and make the stream to flow in its original path. Gradation of the slope by benching.

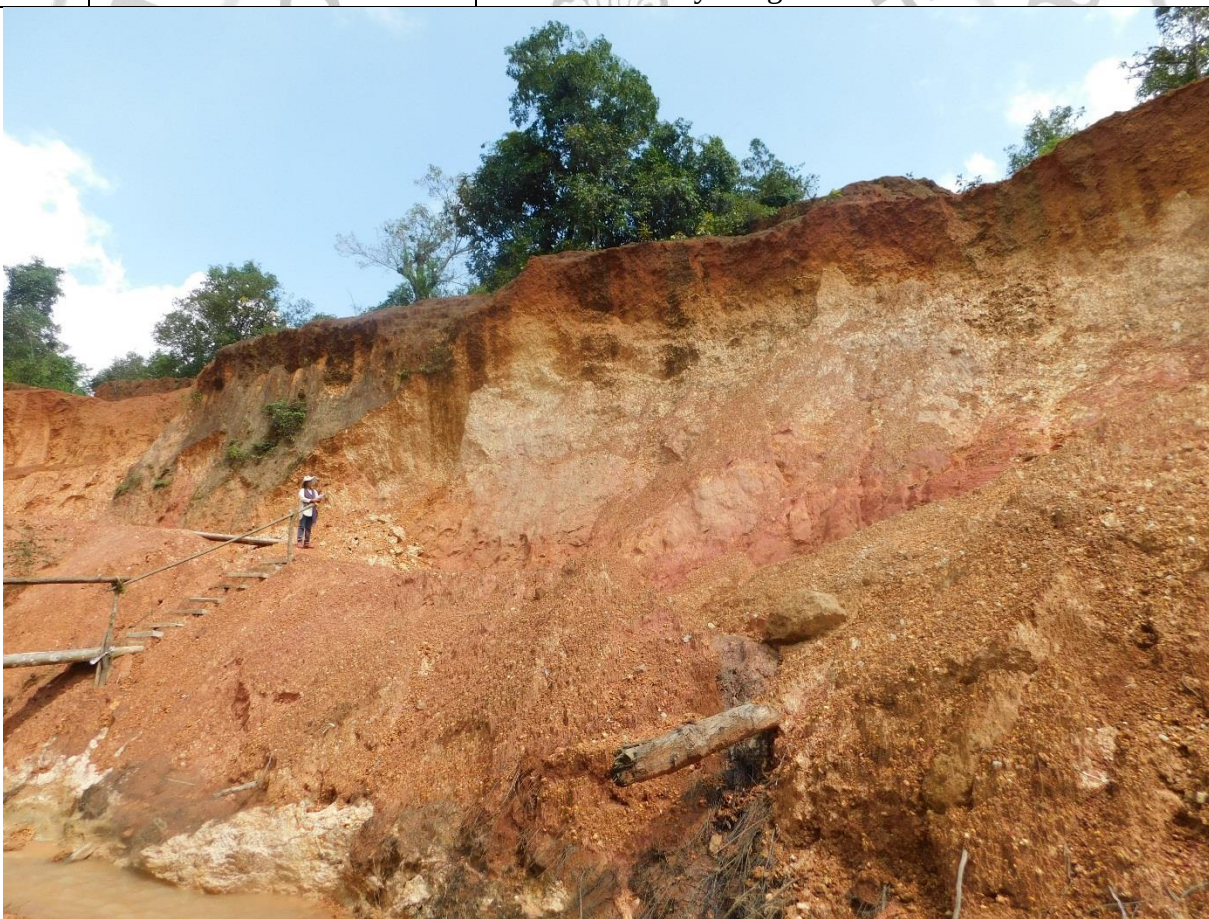
38	Remarks, if any	The slope failed due to Anthropogenic activity and aggravated due to incessant rainfall
39	Summary/Abstract	Main triggering factor is anthropogenic and rainfall and the predisposing factor were slope and presence of overburden as soil.
40	Date of Reporting	15-10-19
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



1851

S. No.	Slide No.	3
1	Slide No.	KAR/SG/48O5/2019/03
2	Latitude (N)	13.7526
3	Longitude (E)	75.2838
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/5
7	Name of the slide	BilliveHariharapura
8	NH/SH/LocalityLocality-BilliveHariharapura	
9	Length (m)	12
10	Width (m)	50
11	Height (m)	10
12	Area (m)	600
13	Depth (m)	2
14	Volume (m)	1200
15	Run out distance (m)	Nil
16	Type of Material	Soil
17	Type of movement	Slide
18	Rate of movement	Rapid
19	Activity	Active
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translationa Failure
23	History	Aug 2019
24	Geomorphology	Rolling plain
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	Moderate vegetation
28	Hydrological condition	Flowing
29	Triggering Factor	Rainfall/Anthropogenic
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Agriculture
36	Geo-scientific Causes	The slope was modified for the plantation purpose by cutting of the toe and incessant rainfall aggravated the slide. The incessant rainfall increased the pore pressure and the soil lost its shear strength. Presence of poor slope forming material (laterite and saprolite layer) also aided in instabilty. The degree of weathering is high. Toe was

		cut by the flowing nala.
37	Remedial measures	Clean the fallen slide material from the slide area and easing of the slope by benching with proper width and height. The original stream flow is to be maintained.
38	Remarks, if any	In the crown portion it was noticed that there is presence of transverse cracks which may lead to further failure in the future.
39	Summary/Abstract	The slide initiated due to anthropogenic activity and aggravated by the incessant rainfall. Further failure may be reduced by benching of the slope and maintaining of the natural stream flow. Avoid cutting of the slope for plantation purpose.
40	Date of Reporting	15-10-2019
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	4
1	Slide No.	KAR/SG/48O5/2019/04
2	Latitude (N)	13.7998
3	Longitude (E)	75.3249
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/5
7	Name of the slide	Jaddinagadde
8	NH/SH/Locality	Locality- Jaddinagadde
9	Length (m)	12
10	Width (m)	40
11	Height (m)	8
12	Area (m)	480
13	Depth (m)	2
14	Volume (m)	960
15	Run out distance (m)	Nil
16	Type of Material	Soil
17	Type of movement	Slide
18	Rate of movement	Rapid
19	Activity	Active
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	June 2019
24	Geomorphology	Lowly dissected slope
25	Geology/Lithology	Quartz-Chlorite Schist
26	Structure	Nil
27	Landuse/ Landcover	Thick vegetation
28	Hydrological condition	Flowing
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Agriculture
36	Geo-scientific Causes	Incessant rainfall increased the pore water pressure in the presence of thick weak slope forming material saprolite. The flowing stream water level increased during the rainfall about 2-3m. This caused the toe cut of the slope vigorously and subsequently slope failed.

37	Remedial measures	Clean the fallen debris and maintain the original stream path. Do not disturb the slope.
38	Remarks, if any	Piping observed just above the toe portion.
39	Summary/Abstract	The length of the slide is small but the width of the slide is 40m and landslide initiated due to incessant rainfall. Clean the fallen debris and maintain the original stream path which will reduce the failure in the future.
40	Date of Reporting	16-10-19
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	5
1	Slide No.	KAR/SG/48O5/2019/05
2	Latitude (N)	13.8046
3	Longitude (E)	75.3244
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/5
7	Name of the slide	Jaddinagadde-1
8	NH/SH/LocalityLocality-	Jaddinagadde
9	Length (m)	25
10	Width (m)	20
11	Height (m)	12
12	Area (m)	500
13	Depth (m)	4
14	Volume (m)	2000
15	Run out distance (m)	Nil
16	Type of Material	Soil
17	Type of movement	Slide
18	Rate of movement	Slow
19	Activity	Active
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Lowly dissected slope
25	Geology/Lithology	Quartz-Chlorite Schist
26	Structure	Nil
27	Landuse/ Landcover	Sparse vegetation
28	Hydrological condition	Damp
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barr en	Agriculture
36	Geo-scientific Causes	Landslide initiated as small slump and later it prograded in to slide. Thick overburden material with incessant rainfall and toe cut by the nala.
37	Remedial measures	Grading of the slope by proper benching with proper height and width and cleaning of the slide material. Maintain the natural stream flow.

38	Remarks, if any	From the crown towards upslope just 6-8m one settlement located. During the rainfall the slide should be monitored properly.
39	Summary/Abstract	Landslide initiated as small slump and later it graded in to slide. Thick overburden material with incessant rainfall and toe cut by the nala. Grading of the slope by proper benching with proper height and width and cleaning of the slide material. Maintain the natural stream flow.
40	Date of Reporting	16-10-2019
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	6
1	Slide No.	KAR/SG/48O5/2019/06
2	Latitude (N)	13.79203
3	Longitude (E)	75.34498
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/5
7	Name of the slide	Kalavatti
8	NH/SH/Locality Locality- Kalavatti	
9	Length (m)	10
10	Width (m)	60
11	Height (m)	8
12	Area (m)	600
13	Depth (m)	2
14	Volume (m)	1200
15	Run out distance (m)	Nil
16	Type of Material	Soil
17	Type of movement	Slide
18	Rate of movement	Slow
19	Activity	Active
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Lowly dissected slope
25	Geology/Lithology	Quartz-Chlorite Schist
26	Structure	Nil
27	Landuse/ Landcover	Thick vegetation
28	Hydrological condition	Damp
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Agriculture
36	Geo-scientific Causes	Continuous rainfall caused the loss of shear strength by increasing pore water pressure. Presence of weak slope forming material. Toe cut by flowing stream.
37	Remedial measures	Original stream flow to be maintained

38	Remarks, if any	Original stream path to be diverted due to the slide and presently the stream is flowing in the agricultural land.
39	Summary/Abstract	During the monsoon season try to maintain the original path.
40	Date of Reporting	16-10-2019
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	7
1	Slide No.	KAR/SG/48O5/2019/07
2	Latitude (N)	13.7931
3	Longitude (E)	75.3466
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/5
7	Name of the slide	Kalavatti-1
8	NH/SH/Locality	Locality- Kalavatti
9	Length (m)	8
10	Width (m)	25
11	Height (m)	8
12	Area (m)	200
13	Depth (m)	1
14	Volume (m)	200
15	Run out distance (m)	Nil
16	Type of Material	Soil
17	Type of movement	Slide
18	Rate of movement	Slow
19	Activity	Active
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Lowly dissected slope
25	Geology/Lithology	Quartz-Chlorite Schist
26	Structure	Nil
27	Landuse/ Landcover	Thick vegetation
28	Hydrological condition	Wet
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Agriculture
36	Geo-scientific Causes	Continuous rainfall caused the loss of shear strength by increasing pore water pressure. Presence of weak slope forming

		material and toe cut by flowing stream.
37	Remedial measures	Original stream flow is to be maintained
38	Remarks, if any	Nil
39	Summary/Abstract	During the monsoon season try to maintain the original path of stream.
40	Date of Reporting	18-10-2019
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



1851

S. No.	Slide No.	8
1	Slide No.	KAR/SG/48O5/2019/08
2	Latitude (N)	13.7881
3	Longitude (E)	75.3426
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/5
7	Name of the slide	Bisilamane
8	NH/SH/LocalityLocality-	Bisilamane
9	Length (m)	5
10	Width (m)	25
11	Height (m)	5
12	Area (m)	125
13	Depth (m)	0.5
14	Volume (m)	62.5
15	Run out distance (m)	Nil
16	Type of Material	Soil
17	Type of movement	Slide
18	Rate of movement	Slow
19	Activity	Active
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Lowly dissected slope
25	Geology/Lithology	Quartz-Chlorite Schist
26	Structure	Nil
27	Landuse/Landcover	High height plantation
28	Hydrological condition	Dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Agriculture

36	Geo-scientific Causes	Continuous rainfall caused the loss of shear strength by increasing pore water pressure. Presence of weak slope forming material and toe cut by flowing stream.
37	Remedial measures	Original stream flow is to be maintained
38	Remarks, if any	Nil
39	Summary/Abstract	During the monsoon season try to maintain the original path of the stream.
40	Date of Reporting	18-10-2019
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	9
1	Slide No.	KAR/SG/48O5/2019/09
2	Latitude (N)	13.7666
3	Longitude (E)	75.2765
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/5
7	Name of the slide	Kaudalli
8	NH/SH/Locality	Locality- Kaudalli
9	Length (m)	6
10	Width (m)	30
11	Height (m)	6
12	Area (m)	180
13	Depth (m)	0.5
14	Volume (m)	90
15	Run out distance (m)	Nil
16	Type of Material	Soil
17	Type of movement	Slide
18	Rate of movement	Slow
19	Activity	Active
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translationa Failure
23	History	Aug 2019
24	Geomorphology	Lowly dissected slope
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	Moderate vegetation
28	Hydrological condition	Dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barrren	Agriculture
36	Geo-scientific Causes	Continuous rainfall caused the loss of shear strength by increasing pore water pressure. Presence of weak slope forming material (saprolite). Toe cut by flowing stream.
37	Remedial measures	Original stream is flow to be maintained
38	Remarks, if any	Lining of the stream is one of the best method to avoid the toe

		cut.
39	Summary/Abstract	Continuous rainfall caused the loss of shear strength by increasing pore water pressure. Presence of weak slope forming material (saprolite). Toe cut by flowing stream. During the monsoon season try to maintain the original path of the stream.
40	Date of Reporting	18-10-2019
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



1851

S. No.	Slide No.	10
1	Slide No.	KAR/SG/48O5/2019/10
2	Latitude (N)	13.7644
3	Longitude (E)	75.3141
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/5
7	Name of the slide	Kavatamane
8	NH/SH/Locality Locality- Kavatamane	
9	Length (m)	15
10	Width (m)	100
11	Height (m)	12
12	Area (m)	1500
13	Depth (m)	1
14	Volume (m)	1500
15	Run out distance (m)	Nil
16	Type of Material	Soil
17	Type of movement	Slide
18	Rate of movement	Slow
19	Activity	Active
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Rolling plain
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	Sparse vegetation
28	Hydrological condition	Wet
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Agriculture
36	Geo-scientific Causes	Slope modified for the cultivation and presence of thick weak slope forming material, during the rain the water level increased in the the stream and the excess water in the stream cut/scoured the slope.
37	Remedial measures	Slope modification should be done with proper engineering consideration and stream course is to be channelized or along the stream towards the hill side

		retaining wall to be constructed to avoid any future toe cut by the stream.
38	Remarks, if any	Nil
39	Summary/Abstract	Slope modified for the cultivation and presence of thick weak slope forming material, during the rain the water level increased in the stream and the excess water in the stream cut/scoured the slope. To avoid the further failure slope modification should be done with proper engineering consideration and stream course is to be channelized or along the stream towards the hill side retaining wall to be constructed to avoid any future toe cut by the stream.
40	Date of Reporting	18-10-2019
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	11
1	Slide No.	KAR/SG/48O5/2019/11
2	Latitude (N)	13.8053
3	Longitude (E)	75.3235
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/5
7	Name of the slide	Dombisara
8	NH/SH/Locality Locality-	Dombisara
9	Length (m)	20
10	Width (m)	12
11	Height (m)	15
12	Area (m)	240
13	Depth (m)	5
14	Volume (m)	1200
15	Run out distance (m)	Nil
16	Type of Material	Soil
17	Type of movement	Slide
18	Rate of movement	Slow
19	Activity	Active
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Deep translational Failure
23	History	Sep 2019
24	Geomorphology	Lowly dissected slope
25	Geology/Lithology	Quartz-Chlorite Schist
26	Structure	Nil
27	Landuse/ Landcover	Thick vegetation
28	Hydrological condition	Wet
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Agriculture
36	Geo-scientific Causes	Steep slope coupled with incessant rainfall caused the increase of the pore water pressure and the soil lost its strength. During the rainfall excess water in the stream cut/scoured the adjacent slope. Presence of thick insitu soil also one of the reason.
37	Remedial measures	Clearing of the fallen slide material from the slide area

		and easing of the slope.
38	Remarks, if any	Lining of the stream is one of the best method to avoid any future toe cut.
39	Summary/Abstract	Steep slope coupled with incessant rainfall caused the increase of the pore water pressure and the soil lost it strength. During the rainfall excess water in the stream cut/scoured the adjacent slope. Presence of thick insitu soil also one of the reason. Clearing of the fallen slide material from the slide area and easing of the slope.
40	Date of Reporting	20-10-2019
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K
		

S. No.	Slide No.	12
1	Slide No.	KAR/SG/48O5/2019/12
2	Latitude (N)	13.8035
3	Longitude (E)	75.3255
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/5
7	Name of the slide	Dombisara-1
8	NH/SH/Locality	Locality- Dombisara
9	Length (m)	12
10	Width (m)	10
11	Height (m)	10
12	Area (m)	120
13	Depth (m)	4
14	Volume (m)	480
15	Run out distance (m)	Nil
16	Type of Material	Debris
17	Type of movement	Slide
18	Rate of movement	Slow
19	Activity	Active
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Sep 2019
24	Geomorphology	Lowly dissected slope
25	Geology/Lithology	Quartz-Chlorite Schist
26	Structure	Nil
27	Landuse/ Landcover	Thick vegetation
28	Hydrological condition	Wet
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/B arren	Agriculture
36	Geo-scientific Causes	Incessant rainfall and toe cut by the flowing stream.
37	Remedial measures	Lining of the stream
38	Remarks, if any	The crown is not visible, due to presence of thick vegetation

39	Summary/Abstract	The slide was initiated during August 2019 due to incessant rainfall.
40	Date of Reporting	20-10-2019
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	13
1	Slide No.	KAR/SG/48O5/2019/13
2	Latitude (N)	13.8022
3	Longitude (E)	75.3281
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/5
7	Name of the slide	Dombisara-2
8	NH/SH/Locality Locality-	Dombisara
9	Length (m)	6
10	Width (m)	18
11	Height (m)	6
12	Area (m)	108
13	Depth (m)	2
14	Volume (m)	216
15	Run out distance (m)	Nil
16	Type of Material	Soil
17	Type of movement	Slide
18	Rate of movement	Slow
19	Activity	Active
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Lowly dissected slope
25	Geology/Lithology	Quartz-Chlorite Schist
26	Structure	Nil
27	Landuse/ Landcover	Thick vegetation
28	Hydrological condition	Wet
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barr en	Agriculture
36	Geo-scientific Causes	Incessant rainfall and toe cut by the flowing stream.
37	Remedial measures	Lining of the stream
38	Remarks, if any	Lining of the stream is one of the best methods to avoid the toe cut in future.
39	Summary/Abstract	The slide was initiated during August 2019 due to incessant

		rainfall.
40	Date of Reporting	20-10-2019
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	14
1	Slide No.	KAR/SG/48O5/2019/14
2	Latitude (N)	13.8021
3	Longitude (E)	75.3358
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/5
7	Name of the slide	Salekoppa
8	NH/SH/Locality Locality-Salekoppa	
9	Length (m)	8
10	Width (m)	20
11	Height (m)	8
12	Area (m)	160
13	Depth (m)	3
14	Volume (m)	480
15	Run out distance (m)	Nil
16	Type of Material	Soil
17	Type of movement	Slide
18	Rate of movement	Slow
19	Activity	Active
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	9th Aug-2019
24	Geomorphology	Lowly dissected slope
25	Geology/Lithology	Quartz-Chlorite Schist
26	Structure	Nil
27	Landuse/ Landcover	Thick vegetation
28	Hydrological condition	Wet
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Agriculture
36	Geo-scientific Causes	Presence of weak slope forming material and incessant rainfall are the causes for the slide.
37	Remedial measures	Construction of retaining wall towards the hill side with weep holes along the course of the channel will decrease the toe cut by the stream.
38	Remarks, if any	Nil

39	Summary/Abstract	Landslide occurred on 9th Aug 2019. Triggering factor of the slide is incessant rain fall. To mitigate the slide toe drain is to be constructed.
40	Date of Reporting	20-10-2019
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	15
1	Slide No.	KAR/SG/48O5/2019/15
2	Latitude (N)	13.8026
3	Longitude (E)	75.3345
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/5
7	Name of the slide	Salekoppa-1
8	NH/SH/Locality	Locality-Salekoppa
9	Length (m)	15
10	Width (m)	20
11	Height (m)	12
12	Area (m)	300
13	Depth (m)	1
14	Volume (m)	300
15	Run out distance (m)	Nil
16	Type of Material	Soil
17	Type of movement	Slide
18	Rate of movement	Slow
19	Activity	Active
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	9th Aug-2019
24	Geomorphology	Lowly dissected slope
25	Geology/Lithology	Quartz-Chlorite Schist
26	Structure	Nil
27	Landuse/ Landcover	High height plantation
28	Hydrological condition	Wet
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Forest
36	Geo-scientific Causes	Presence of weak but thick slope forming material and incessant rainfall are the causes for the slide.
37	Remedial measures	Clearing of the slide material from the slide area and regularize the channel flow.

38	Remarks, if any	Nil
39	Summary/Abstract	Incessant rain fall is one of the triggering factors for the slide. The slope forming material sandy clay aided the failure.
40	Date of Reporting	20-10-2019
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	16
1	Slide No.	KAR/SG/48O5/2019/16
2	Latitude (N)	13.8028
3	Longitude (E)	75.3339
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/5
7	Name of the slide	Salekoppa-2
8	NH/SH/Locality Locality-Salekoppa	
9	Length (m)	18
10	Width (m)	25
11	Height (m)	12
12	Area (m)	450
13	Depth (m)	5
14	Volume (m)	2250
15	Run out distance (m)	Nil
16	Type of Material	Soil
17	Type of movement	Slide
18	Rate of movement	Slow
19	Activity	Active
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Deep translational Failure
23	History	9th Aug-2019
24	Geomorphology	Lowly dissected slope
25	Geology/Lithology	Quartz-Chlorite Schist
26	Structure	Nil
27	Landuse/ Landcover	Thick vegetation
28	Hydrological condition	Damp
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Forest
36	Geo-scientific Causes	Weak slope forming material coupled with incessant rainfall. Incessant rainfall caused the increase of the pore pressure.
37	Remedial measures	Clearing of the debris from the slide area to regularize the natural stream flow. Construction of channel wall to

		avoid the toe cut by the stream.
38	Remarks, if any	Nil
39	Summary/Abstract	Weak slope forming material coupled with incessant rainfall. Incessant rainfall caused increase of the pore pressure. Clearing of the debris from the slide area to regularize the natural stream flow. Construction of channel wall to avoid the toe cut by the stream.
40	Date of Reporting	20-10-2019
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	17
1	Slide No.	KAR/SG/48O5/2019/17
2	Latitude (N)	13.8024
3	Longitude (E)	75.3326
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/5
7	Name of the slide	Salekoppa-3
8	NH/SH/LocalityLocality-Salekoppa	
9	Length (m)	6
10	Width (m)	25
11	Height (m)	6
12	Area (m)	150
13	Depth (m)	1
14	Volume (m)	150
15	Run out distance (m)	Nil
16	Type of Material	Soil
17	Type of movement	Slide
18	Rate of movement	Slow
19	Activity	Active
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	09th Aug-2019
24	Geomorphology	Lowly dissected slope
25	Geology/Lithology	Quartz-Chlorite Schist
26	Structure	Nil
27	Landuse/ Landcover	Thick vegetation
28	Hydrological condition	Damp
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Forest
36	Geo-scientific Causes	High degree of weathering and weak slope forming material, sudden drop of the slope between the valley and hill side. Incessant rainfall and toe cut by the flowing of the stream.
37	Remedial measures	Channel wall to be constructed to avoid the toe erosion.
38	Remarks, if any	Nil

39	Summary/Abstract	High degree of weathering and weak slope forming material, sudden drop of the slope between the valley and hill side. Incessant rainfall and toe cut/scouring by the flowing stream. Channel wall to be constructed to avoid the toe erosion.
40	Date of Reporting	20-10-2019
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	18
1	Slide No.	KAR/SG/48O5/2019/18
2	Latitude (N)	13.802
3	Longitude (E)	75.3304
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/5
7	Name of the slide	Dombisara-3
8	NH/SH/Locality Locality-Dombisara	
9	Length (m)	10
10	Width (m)	15
11	Height (m)	6
12	Area (m)	150
13	Depth (m)	4
14	Volume (m)	600
15	Run out distance (m)	Nil
16	Type of Material	Soil
17	Type of movement	Slide
18	Rate of movement	Slow
19	Activity	Active
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	09th Aug-2019
24	Geomorphology	Lowly dissected slope
25	Geology/Lithology	Quartz-Chlorite Schist
26	Structure	Nil
27	Landuse/ Landcover	Thick vegetation
28	Hydrological condition	Flowing
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Forest
36	Geo-scientific Causes	Steep slope coupled with incessant rainfall caused the increase of the pore water pressure and the soil lost its strength. During the rainfall excess water in the stream cut the adjacent slopebank. Presence of thick insitu soil is also one of the reasons.
37	Remedial measures	Channel wall to be constructed to avoid the toe erosion.

38	Remarks, if any	Nil
39	Summary/Abstract	Steep slope coupled with incessant rainfall caused the increase of the pore water pressure and the soil lost its strength. During the rainfall excess water in the stream cut the adjacent slopebank. Presence of thick insitu soil is also one of the reasons.
40	Date of Reporting	20-10-2019
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



1851

S. No.	Slide No.	19
1	Slide No.	KAR/SG/48O5/2019/19
2	Latitude (N)	13.7634
3	Longitude (E)	75.4508
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/5
7	Name of the slide	Halusuvala
8	NH/SH/LocalityRoad connecting Halagadde and Halusuvala	
9	Length (m)	5
10	Width (m)	15
11	Height (m)	4
12	Area (m)	75
13	Depth (m)	0.5
14	Volume (m)	37.5
15	Run out distance (m)	Nil
16	Type of Material	Soil
17	Type of movement	Slide
18	Rate of movement	Slow
19	Activity	Active
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	09th Aug-2019
24	Geomorphology	Lowly dissected slope
25	Geology/Lithology	Amphibolite
26	Structure	Nil
27	Landuse/ Landcover	Thick vegetation
28	Hydrological condition	Damp
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Forest
36	Geo-scientific Causes	Toe cut for the road construction and presence of saprolite layer on slope and incessant rainfall.
37	Remedial measures	Construction of retaining wall with weep holes and hill side drain may reduce the further failure.
38	Remarks, if any	
39	Summary/Abstract	Toe cut for the road construction and presence of saprolite

		layer on slope and incessant rainfall. Construction of retaining wall with weep holes and hill side drain may reduce the further failure.
40	Date of Reporting	20-10-2019
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	20
1	Slide No.	KAR/SG/48O5/2019/20
2	Latitude (N)	13.9167
3	Longitude (E)	75.3711
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/5
7	Name of the slide	Hallimangatta
8	NH/SH/LocalityLocality-Hallimangatta	
9	Length (m)	20
10	Width (m)	6
11	Height (m)	18
12	Area (m)	120
13	Depth (m)	1
14	Volume (m)	120
15	Run out distance (m)	40
16	Type of Material	Debris
17	Type of movement	Flow
18	Rate of movement	Rapid
19	Activity	suspended
20	Distribution	Retrogressive
21	Style	multiple
22	Failure mechanism	Shallow translational Failure
23	History	13th Aug 2019
24	Geomorphology	Moderately dissected slope
25	Geology/Lithology	Ferrugenous phyllite
26	Structure	Nil
27	Landuse/ Landcover	Thick vegetation
28	Hydrological condition	Damp
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Forest
36	Geo-scientific Causes	Slope angle ranges from 25-35 degree and the interface between the overburden and bed rock is very less along the flow direction. At fewplaces the overburden thickness ranges from 2-3m. Incessant rainfall is also one of the

		triggering factors for the slide.
37	Remedial measures	Original stream flow to be maintained
38	Remarks, if any	Nil
39	Summary/Abstract	Initially Slope angle ranges from 25-35 degree and the interface between the overburden and bed rock is very less along the flow direction. At few places the overburden thickness ranges from 2-3m. Incessant rainfall is also one of the triggering factors for the slide.
40	Date of Reporting	20-10-2019
41	Landslide Category	Category-II
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	21
1	Slide No.	KAR/SG/48O5/2019/21
2	Latitude (N)	13.8734
3	Longitude (E)	75.3979
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/5
7	Name of the slide	Mulisara
8	NH/SH/Locality	Road connecting Kallukoppa and Kannangi
9	Length (m)	7
10	Width (m)	6
11	Height (m)	6
12	Area (m)	42
13	Depth (m)	1
14	Volume (m)	42
15	Run out distance (m)	Nil
16	Type of Material	Debris
17	Type of movement	slide
18	Rate of movement	Rapid
19	Activity	Active
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	19-Aug
24	Geomorphology	Lowly dissected slope
25	Geology/Lithology	Metabasalt
26	Structure	Nil
27	Landuse/ Landcover	Thick vegetation
28	Hydrological condition	dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	plantation
36	Geo-scientific Causes	Toe cut for the road construction without proper remedial measures and leaving the slope vertically unstable. Weak slope forming material and incessant rainfall may have caused increase of pore water pressure locally.
37	Remedial measures	Retaining wall with proper weep holes and proper back filling is to be provided at toe of the slide.

38	Remarks, if any	Nil
39	Summary/Abstract	The slide is very smaller dimension and after the toe cut the slope is not treated with engineering consideration and leaving the slope vertically unstable.
40	Date of Reporting	10-11-2019
41	Landslide Category	Category-II
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	22
1	Slide No.	KAR/SG/48O5/2019/22
2	Latitude (N)	13.8427
3	Longitude (E)	75.2907
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/5
7	Name of the slide	Torebaillu
8	NH/SH/Locality Locality-Torebaillu	
9	Length (m)	10
10	Width (m)	15
11	Height (m)	8
12	Area (m)	150
13	Depth (m)	3
14	Volume (m)	450
15	Run out distance (m)	Nil
16	Type of Material	Debris
17	Type of movement	slide
18	Rate of movement	Rapid
19	Activity	Active
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	11th Aug 2019
24	Geomorphology	Rolling plain
25	Geology/Lithology	Quartz-Chlorite Schist
26	Structure	Nil
27	Landuse/ Landcover	Sparse vegetation
28	Hydrological condition	wet
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Forest
36	Geo-scientific Causes	vertical slope coupled with thick overburden and incessant rainfall are the main geo-scientific causes for the slide
37	Remedial measures	Removal of the slide materials from the slide area and maintaining of the natural stream water course. Broom

		grass plantation or veriver grass plantation will increase soil holding capacity.
38	Remarks, if any	Nil
39	Summary/Abstract	Vertical slope coupled with thick overburden and incessant rainfall is the main geo-scientific causes for the slide. Removal of the slide materials from the slide area and maintaining of the natural stream water course. Broom grass plantation or veriver grass plantation will increase soil holding capacity.
40	Date of Reporting	10-11-2019
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	23
1	Slide No.	KAR/SG/48O5/2019/23
2	Latitude (N)	13.8564
3	Longitude (E)	75.3722
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/5
7	Name of the slide	Alase
8	NH/SH/LocalityLocality-Alase	
9	Length (m)	35
10	Width (m)	20
11	Height (m)	30
12	Area (m)	700
13	Depth (m)	4
14	Volume (m)	2800
15	Run out distance (m)	100
16	Type of Material	Debris
17	Type of movement	Flow
18	Rate of movement	Rapid
19	Activity	Active
20	Distribution	Retrogressive/Widening
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	9th Aug 2019
24	Geomorphology	Moderately dissected slope
25	Geology/Lithology	Quartz-Chlorite Schist
26	Structure	Nil
27	Landuse/ Landcover	Thick vegetation
28	Hydrological condition	dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Forest
36	Geo-scientific Causes	Steep slope and the interface between the overburden and bedrock is very less. Continuous rainfall may have reduced the shear strength of the soil.
37	Remedial measures	At the top of the crown precariously hanging boulder is to be removed and do not disturb the original flow direction of the stream.

38	Remarks, if any	Along the same hill range many slides were initiated during August 2019 rainfall.
39	Summary/Abstract	The slide initiated on 9th Aug 2019. The slide originated at the top of the hill and flowed towards the down slope direction.
40	Date of Reporting	13-11-2019
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	24
1	Slide No.	KAR/SG/48O5/2019/24
2	Latitude (N)	13.8538
3	Longitude (E)	75.4227
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/5
7	Name of the slide	Hanigeri
8	NH/SH/Locality	Locality-Hanigeri
9	Length (m)	35
10	Width (m)	20
11	Height (m)	32
12	Area (m)	700
13	Depth (m)	1
14	Volume (m)	700
15	Run out distance (m)	92
16	Type of Material	Debris
17	Type of movement	Flow
18	Rate of movement	Rapid
19	Activity	Active
20	Distribution	Retrogressive/Widening
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	9th Aug 2019
24	Geomorphology	Moderately dissected slope
25	Geology/Lithology	Ferruginous phyllite
26	Structure	Nil
27	Landuse/ Landcover	Thick vegetation
28	Hydrological condition	Wet
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Forest
36	Geo-scientific Causes	Incessant rainfall and steep slope are the major causes for the slide. The interface between the overburden and bed rock is very less.
37	Remedial measures	Maintain the original nala course. Do not construct any settlement along the flow direction. This landslide to be monitored during the future rainy season.

38	Remarks, if any	Nil
39	Summary/Abstract	The slide originated in the high to moderately dissected steep slope. Initially the slide occurred as a soil slide later graded into debris flow. This debris flow should be monitored during the rainy season.
40	Date of Reporting	16-11-2019
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



1851

S. No.	Slide No.	25
1	Slide No.	KAR/SG/48O5/2019/25
2	Latitude (N)	13.8534
3	Longitude (E)	75.4218
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/5
7	Name of the slide	Hanigeri-1
8	NH/SH/Locality Locality-Hanigeri	
9	Length (m)	60
10	Width (m)	12
11	Height (m)	50
12	Area (m)	720
13	Depth (m)	1
14	Volume (m)	720
15	Run out distance (m)	40
16	Type of Material	Debris
17	Type of movement	Flow
18	Rate of movement	Rapid
19	Activity	Active
20	Distribution	Retrogressive/Widening
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	9th Aug 2019
24	Geomorphology	Moderately dissected slope
25	Geology/Lithology	Ferruginous phyllite
26	Structure	Nil
27	Landuse/ Landcover	Thick vegetation
28	Hydrological condition	Wet
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Forest
36	Geo-scientific Causes	Continuous rainfall locally increased the pore water pressure and the soil along the steep slope lost its strength and failed. The failed material flowed towards the down slope by carrying adjacent materials. The slope gradient ranges from 30-40 degree. Interface between the

		overburden and bedrock is less.
37	Remedial measures	Maintain the original nala course. Do not construct any settlement along the flow direction. This landslide to be monitored during the rainy season.
38	Remarks, if any	Nil
39	Summary/Abstract	The slide originated in the high to moderately dissected steep slope. Continuous rainfall locally increased the pore water pressure and the soil along the steep slope lost its strength and failed. The failed material flowed towards the down slope by carrying adjacent materials. The slope gradient ranges from 30-40 degree. Interface between the overburden and bedrock is less.
40	Date of Reporting	16-11-2019
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	26
1	Slide No.	KAR/SG/48O5/2019/26
2	Latitude (N)	13.8501
3	Longitude (E)	75.4222
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/5
7	Name of the slide	Hanigeri-2
8	NH/SH/Locality	Locality-Hanigeri
9	Length (m)	36
10	Width (m)	12
11	Height (m)	30
12	Area (m)	432
13	Depth (m)	1
14	Volume (m)	432
15	Run out distance (m)	20
16	Type of Material	Debris
17	Type of movement	Flow
18	Rate of movement	Rapid
19	Activity	Active
20	Distribution	Retrogressive/Widening
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	9th Aug 2019
24	Geomorphology	Moderately dissected slope
25	Geology/Lithology	Ferruginous phyllite
26	Structure	Nil
27	Landuse/ Landcover	Thick vegetation
28	Hydrological condition	Damp
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Forest
36	Geo-scientific Causes	Interface between the overburden and bedrock is less. The slope gradient and continuous rainfall locally increased the pore water pressure and the soil along the steep slope lost its strength and failed. The failed material flowed towards the down slope by carrying adjacent

		materials.
37	Remedial measures	Maintain the natural stream course
38	Remarks, if any	Nil
39	Summary/Abstract	The debris flow originated in the thick forest during the rainy season. The slope gradient is high and the slopes are moderately dissected. During the rainy season the slide to be monitored properly.
40	Date of Reporting	16-11-2019
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	27
1	Slide No.	KAR/SG/48O5/2019/27
2	Latitude (N)	13.8664
3	Longitude (E)	75.419
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/5
7	Name of the slide	Hanigeri-3
8	NH/SH/Locality Locality-Hanigeri	
9	Length (m)	35
10	Width (m)	25
11	Height (m)	30
12	Area (m)	875
13	Depth (m)	1
14	Volume (m)	875
15	Run out distance (m)	30
16	Type of Material	Debris
17	Type of movement	Flow
18	Rate of movement	Rapid
19	Activity	Active
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	18th Aug 2019
24	Geomorphology	Moderately dissected slope
25	Geology/Lithology	Ferruginous phyllite
26	Structure	Nil
27	Landuse/ Landcover	Thick vegetation
28	Hydrological condition	Damp
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Forest
36	Geo-scientific Causes	Weak slope forming material and steep slope coupled with incessant rain.
37	Remedial measures	Maintain the natural stream course
38	Remarks, if any	Nil
39	Summary/Abstract	Debris flow occurred on 19th Aug 2019 in the thick forest

		and the slopes are moderately dissected. Debris flow initiated due to incessant rainfall.
40	Date of Reporting	17-11-2019
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	28
1	Slide No.	KAR/SG/48O5/2019/28
2	Latitude (N)	13.8483
3	Longitude (E)	75.3877
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/5
7	Name of the slide	Makeri-1
8	NH/SH/Locality	Locality- Makeri
9	Length (m)	18
10	Width (m)	12
11	Height (m)	15
12	Area (m)	216
13	Depth (m)	1
14	Volume (m)	216
15	Run out distance (m)	20
16	Type of Material	Debris
17	Type of movement	Flow
18	Rate of movement	Rapid
19	Activity	Active
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	18th Aug 2019
24	Geomorphology	Moderately dissected slope
25	Geology/Lithology	Ferruginous phyllite
26	Structure	Nil
27	Landuse/ Landcover	Thick vegetation
28	Hydrological condition	Damp
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barrren	Forest
36	Geo-scientific Causes	Weak slope forming material and steep slope coupled with continuous rainfall increased the pore pressure in the overburden.

		The overburden materials is highly weathered clayey material which lead to slippery of the material along the weaker plan.
37	Remedial measures	Maintain the natural stream course
38	Remarks, if any	Nil
39	Summary/Abstract	Debris flow occurred on 19th Aug 2019 in the thick forest where the slopes are moderately dissected. Debris flow initiated due to incessant rainfall. Weak slope forming material and steep slope coupled with continuous rainfall increased the pore pressure in the overburden. The overburden material is highly weathered clayey material which leads to slippery of the material along the weaker plan.
40	Date of Reporting	18-11-2019
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	29
1	Slide No.	KAR/SG/48O5/2019/29
2	Latitude (N)	13.8482
3	Longitude (E)	75.3873
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/5
7	Name of the slide	Makeri-2
8	NH/SH/Locality Locality- Makeri	
9	Length (m)	20
10	Width (m)	8
11	Height (m)	15
12	Area (m)	160
13	Depth (m)	1
14	Volume (m)	160
15	Run out distance (m)	20
16	Type of Material	Debris
17	Type of movement	Flow
18	Rate of movement	Rapid
19	Activity	Active
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	18th Aug 2019
24	Geomorphology	Moderately dissected slope
25	Geology/Lithology	Ferruginous phyllite
26	Structure	Nil
27	Landuse/ Landcover	Thick vegetation
28	Hydrological condition	Damp
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Forest
36	Geo-scientific Causes	Weak slope forming material and steep slope coupled with continuous rainfall increased the pore pressure in the overburden. The overburden material is highly weathered clayey material which leads to slippery of the material along the weaker plan.

37	Remedial measures	Maintain the natural stream course
38	Remarks, if any	Nil
39	Summary/Abstract	Debris flow occurred on 19th Aug 2019 in the thick forest where the slopes are moderately dissected. Debris flow initiated due to incessant rainfall. Weak slope forming material and steep slope coupled with continuous rainfall increased the pore pressure in the overburden. The overburden materials are highly weathered clayey material which lead to slippery of the material along the weaker plan.
40	Date of Reporting	18-11-2019
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



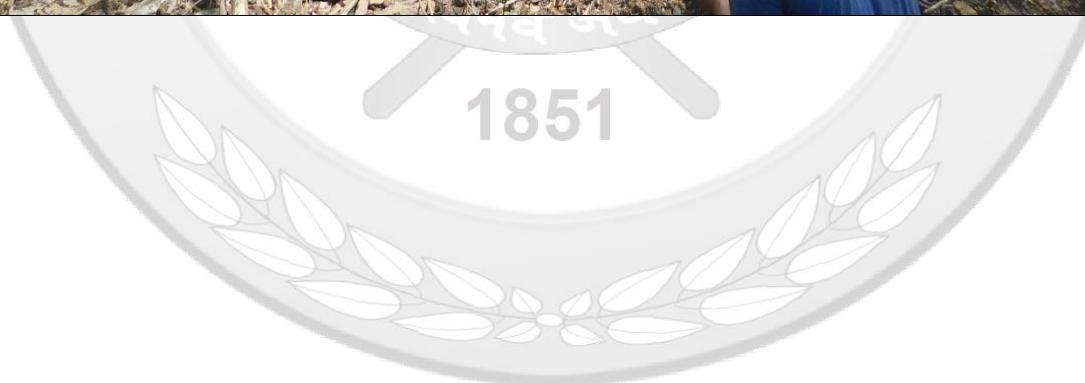
S. No.	Slide No.	30
1	Slide No.	KAR/SG/48O5/2019/30
2	Latitude (N)	13.8394
3	Longitude (E)	75.3807
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/5
7	Name of the slide	Makeri
8	NH/SH/Locality	Locality- Makeri
9	Length (m)	35
10	Width (m)	8
11	Height (m)	32
12	Area (m)	280
13	Depth (m)	2
14	Volume (m)	560
15	Run out distance (m)	12
16	Type of Material	Debris
17	Type of movement	Flow
18	Rate of movement	Rapid
19	Activity	Active
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	18th Aug 2019
24	Geomorphology	Moderately dissected slope
25	Geology/Lithology	Ferruginous phyllite
26	Structure	Nil
27	Landuse/ Landcover	Thick vegetation
28	Hydrological condition	Dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Forest
36	Geo-scientific Causes	The slope forming materials highly weathered and foliated. Water percolated along the weaker plane and materials failed along the surface of the weaker plane.
37	Remedial measures	Maintain the natural stream course
38	Remarks, if any	The failed overburden material are of two distinguished

		colour.
39	Summary/Abstract	On 18th Aug 2019 debris flow occurred in the moderately dissected hills. The predisposing factors are steep slope and presence of slope forming material.
40	Date of Reporting	18-11-2019
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	31
1	Slide No.	KAR/SG/48O5/2019/31
2	Latitude (N)	13.8737
3	Longitude (E)	75.3707
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/5
7	Name of the slide	Hebballi
8	NH/SH/Locality Locality- Hebballi	
9	Length (m)	10
10	Width (m)	6
11	Height (m)	8
12	Area (m)	60
13	Depth (m)	0.5
14	Volume (m)	30
15	Run out distance (m)	12
16	Type of Material	Debris
17	Type of movement	Flow
18	Rate of movement	Rapid
19	Activity	suspended
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	19-Aug
24	Geomorphology	Moderately dissected slope
25	Geology/Lithology	Quartz-Chlorite Schist
26	Structure	Nil
27	Landuse/ Landcover	Thick vegetation
28	Hydrological condition	wet
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Forest
36	Geo-scientific Causes	Interface between the overburden and bedrock is very low. Continuous rainfall has increased the pore water pressure in the overburden.
37	Remedial measures	Maintain the natural stream course
38	Remarks, if any	Nil

39	Summary/Abstract	On 18th Aug 2019 debris flow occurred in the moderately dissected hills. The predisposing factors are steep slope and interface between the overburden and bed rock is very low.
40	Date of Reporting	19-11-2019
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	32
1	Slide No.	KAR/SG/48O5/2019/32
2	Latitude (N)	13.8855
3	Longitude (E)	75.3276
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/5
7	Name of the slide	Maskani
8	NH/SH/Locality	Locality- Maskani
9	Length (m)	12
10	Width (m)	25
11	Height (m)	10
12	Area (m)	300
13	Depth (m)	1
14	Volume (m)	300
15	Run out distance (m)	Nil
16	Type of Material	Soil
17	Type of movement	Slide
18	Rate of movement	rapid
19	Activity	Active
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Moderately dissected slope
25	Geology/Lithology	Quartz-Chlorite Schist
26	Structure	Nil
27	Landuse/ Landcover	High height plantation
28	Hydrological condition	Damp
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Forest
36	Geo-scientific Causes	Vertical slope, thick overburden and incessant rain fall are the main cuses. Continuous rainfall increased the pore water pressure in the thick overburden. So the overburden lost its strength and the failure happened along the steep slope.
37	Remedial measures	Reduce the slope by benching and lining of the stream may

		reduce any further failure.
38	Remarks, if any	The slope also disturbed by anthropogenic activity by excavating the material from the slope for cultivation.
39	Summary/Abstract	This soil slide occurred during the monsoon. The main predisposing factors are vertical slope, thick overburden and the triggering factor is rainfall.
40	Date of Reporting	20-11-2019
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



1851

S. No.	Slide No.	33
1	Slide No.	KAR/SG/48O5/2019/33
2	Latitude (N)	13.8884
3	Longitude (E)	75.3307
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/5
7	Name of the slide	Maskani-1
8	NH/SH/Locality Locality- Maskani	
9	Length (m)	8
10	Width (m)	7
11	Height (m)	6
12	Area (m)	56
13	Depth (m)	0.5
14	Volume (m)	28
15	Run out distance (m)	Nil
16	Type of Material	Soil
17	Type of movement	Slide
18	Rate of movement	Slow
19	Activity	Active
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Moderately dissected slope
25	Geology/Lithology	Quartz-Chlorite Schist
26	Structure	Nil
27	Landuse/ Landcover	Thick vegetation
28	Hydrological condition	damp
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Agriculture
36	Geo-scientific Causes	Incessant rainfall and weak slope forming material. Toe cut by the flowing stream.
37	Remedial measures	Channel wall to be constructed to avoid the toe erosion.

38	Remarks, if any	Nil
39	Summary/Abstract	Incessant rainfall and weak slope forming material. Toe cut by the flowing stream. Channel wall to be constructed to avoid the toe erosion.
40	Date of Reporting	20-11-2019
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	34
1	Slide No.	KAR/SG/48O5/2019/34
2	Latitude (N)	13.8884
3	Longitude (E)	75.3306
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/5
7	Name of the slide	Maskani-2
8	NH/SH/Locality Locality- Maskani	
9	Length (m)	12
10	Width (m)	8
11	Height (m)	9
12	Area (m)	96
13	Depth (m)	0.5
14	Volume (m)	48
15	Run out distance (m)	Nil
16	Type of Material	Soil
17	Type of movement	Slide
18	Rate of movement	Slow
19	Activity	Active
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Moderately dissected slope
25	Geology/Lithology	Quartz-Chlorite Schist
26	Structure	Nil
27	Landuse/ Landcover	Thick vegetation
28	Hydrological condition	damp
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Agriculture
36	Geo-scientific Causes	Incessant rainfall and weak slope forming material. Toe cut by the flowing stream.
37	Remedial measures	Channel wall to be constructed to avoid the toe erosion.
38	Remarks, if any	Nil
39	Summary/Abstract	Incessant rainfall and weak slope forming material. Toe cut by the flowing stream. Channel wall to be constructed to

		avoid the toe erosion.
40	Date of Reporting	20-11-2019
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	35
1	Slide No.	KAR/SG/48O5/2019/35
2	Latitude (N)	13.893
3	Longitude (E)	75.3281
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/5
7	Name of the slide	Maskani-3
8	NH/SH/Locality Locality- Maskani	
9	Length (m)	15
10	Width (m)	15
11	Height (m)	12
12	Area (m)	225
13	Depth (m)	1
14	Volume (m)	225
15	Run out distance (m)	Nil
16	Type of Material	Debris
17	Type of movement	Slide
18	Rate of movement	Slow
19	Activity	Active
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Moderately dissected slope
25	Geology/Lithology	Quartz-Chlorite Schist
26	Structure	Nil
27	Landuse/ Landcover	Thick vegetation
28	Hydrological condition	damp
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Agriculture
36	Geo-scientific Causes	Presence of narrow valley and steep slope and weak slope forming material and incessant rain fall are the main causes.
37	Remedial measures	Clearing of the slide material and construction of channel wall to reduce the toe cut by the nala. Broom grass

		plantation or veriver grass plantation will increase soil holding capacity.
38	Remarks, if any	Nil
39	Summary/Abstract	The soil slide occurred in the narrow valley. During the incessant rainfall, the water increased in the narrow valley and its starts to cut the toe. Construction of channel wall Broom grass plantation or veriver grass plantation will increase soil holding capacity.
40	Date of Reporting	20-11-2019
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	36
1	Slide No.	KAR/SG/48O5/2019/36
2	Latitude (N)	13.9034
3	Longitude (E)	75.2995
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/5
7	Name of the slide	Jiregemane
8	NH/SH/Locality Locality- Jiregemane	
9	Length (m)	8
10	Width (m)	50
11	Height (m)	6
12	Area (m)	400
13	Depth (m)	1
14	Volume (m)	400
15	Run out distance (m)	Nil
16	Type of Material	Debris
17	Type of movement	slide
18	Rate of movement	Slow
19	Activity	Active
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 20219
24	Geomorphology	Moderately dissected slope
25	Geology/Lithology	Quartz-Chlorite Schist
26	Structure	Nil
27	Landuse/ Landcover	Thick vegetation
28	Hydrological condition	damp
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Agriculture
36	Geo-scientific Causes	Weak slope forming material in the steep slope and incessant rainfall caused the increase of the water level in the narrow stream and increased the pore water pressure.
37	Remedial measures	Clearing of the slide material and construction of channel wall to reduce the toe cut by the nala. Broom grass plantation or veriver grass plantation will increase soil

		holding capacity.
38	Remarks, if any	Nil
39	Summary/Abstract	Weak slope forming material in the steep slope and incessant rainfall caused the increase of the water level in the narrow stream and increased the pore water pressure. Clearing of the slide material and construction of channel wall to reduce the toe cut by the nala. Broom grass plantation or veriver grass plantation will increase soil holding capacity.
40	Date of Reporting	25-11-2019
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K
		

S. No.	Slide No.	37
1	Slide No.	KAR/SG/48O5/2019/37
2	Latitude (N)	13.9048
3	Longitude (E)	75.2971
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/5
7	Name of the slide	Jiregemane-1
8	NH/SH/LocalityLocality-	Jiregemane
9	Length (m)	6
10	Width (m)	30
11	Height (m)	6
12	Area (m)	180
13	Depth (m)	3
14	Volume (m)	540
15	Run out distance (m)	Nil
16	Type of Material	Debris
17	Type of movement	Slide
18	Rate of movement	Slow
19	Activity	Active
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Moderately dissected slope
25	Geology/Lithology	Quartz-Chlorite Schist
26	Structure	Nil
27	Landuse/ Landcover	Thick vegetation
28	Hydrological condition	damp
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Forest
36	Geo-scientific Causes	Incessant rainfall increased pore water pressure and toe cut by nala. The main predisposing factor is weak slope forming material such as saprolite (clayey martial).
37	Remedial measures	Easing of the slope and planting the suitable grasson the slope construction of channel wall will reduce the future failure.
38	Remarks, if any	Nil

39	Summary/Abstract	Incessant rainfall increased pore water pressure and toe cut by nala. The main predisposing factor is weak slope forming material such as saprolite (clayey martial). Easing of the slope and planting the slope with suitable grass, construction of channel wall will reduce the future failure.
40	Date of Reporting	25-11-2019
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



1851

S. No.	Slide No.	38
1	Slide No.	KAR/SG/48O5/2019/38
2	Latitude (N)	13.8992
3	Longitude (E)	75.3019
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/5
7	Name of the slide	Jiregemane-2
8	NH/SH/Locality Locality- Jiregemane	
9	Length (m)	5
10	Width (m)	2
11	Height (m)	4
12	Area (m)	10
13	Depth (m)	0.5
14	Volume (m)	5
15	Run out distance (m)	Nil
16	Type of Material	Debris
17	Type of movement	Slide
18	Rate of movement	Rapid
19	Activity	Active
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Moderately dissected slope
25	Geology/Lithology	Quartz-Chlorite Schist
26	Structure	Nil
27	Landuse/ Landcover	Thick vegetation
28	Hydrological condition	Dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Forest
36	Geo-scientific Causes	Incessant rainfall and toe cut by the flowing stream.
37	Remedial measures	Construction of channel wall will reduce the future failure.
38	Remarks, if any	Nil

39	Summary/Abstract	Incessant rainfall and toe cut by the flowing stream. Construction of channel wall will reduce the future failure.
40	Date of Reporting	25-11-2019
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	39
1	Slide No.	KAR/SG/48O5/2019/39
2	Latitude (N)	13.9014
3	Longitude (E)	75.3009
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/5
7	Name of the slide	Jiregemane-3
8	NH/SH/Locality Locality- Jiregemane	
9	Length (m)	7
10	Width (m)	15
11	Height (m)	5
12	Area (m)	105
13	Depth (m)	3
14	Volume (m)	315
15	Run out distance (m)	Nil
16	Type of Material	Soil
17	Type of movement	Slide
18	Rate of movement	slow
19	Activity	Active
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Moderately dissected slope
25	Geology/Lithology	Quartz-Chlorite Schist
26	Structure	Nil
27	Landuse/ Landcover	Thick vegetation
28	Hydrological condition	Damp
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Forest
36	Geo-scientific Causes	Thick overburden in the steep slope without any support and incessant rainfall increased the water in the stream course and lead to toe cut.
37	Remedial measures	Clearing of the debris from the slide area and maintain the natural stream course, applying geojute or planting suitable grass may reduce the further failure.

38	Remarks, if any	Nil
39	Summary/Abstract	Slide is triggered by the incessant rainfall and predisposing factors are weak slope forming material coupled with steep slope and drainage condition. Applying geojute or planting suitable grass may reduce the further failure.
40	Date of Reporting	25-11-2019
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	40
1	Slide No.	KAR/SG/48O1/2019/40
2	Latitude (N)	13.7526
3	Longitude (E)	75.2426
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Taragoli
8	NH/SH/LocalityLocality- Taragoli	
9	Length (m)	5
10	Width (m)	8
11	Height (m)	4
12	Area (m)	40
13	Depth (m)	0.2
14	Volume (m)	8
15	Run out distance (m)	Nil
16	Type of Material	Debris
17	Type of movement	Slide
18	Rate of movement	Slow
19	Activity	suspended
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Lowly dissected hills
25	Geology/Lithology	Amphibolite
26	Structure	Nil
27	Landuse/ Landcover	Thick vegetation
28	Hydrological condition	Dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Agriculture
36	Geo-scientific Causes	Incessant rainfall increased the pore water pressure in the soil and the soil lost its strength as there was weak slope forming material in the steep slope.
37	Remedial measures	Construction of retaining wall with weep holes or modification of slope by benching is recommended.
38	Remarks, if any	From the crown 0.5 m towards upslope one settlement

		located.
39	Summary/Abstract	Slide initiated during the August 2019 monsoon. Slide happed due to increase of the pore water pressure. During the rainy season settlement should be evacuated.
40	Date of Reporting	28-11-2019
41	Landslide Category	Category-II
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	41
1	Slide No.	KAR/SG/48O1/2019/41
2	Latitude (N)	13.7595
3	Longitude (E)	75.2379
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Taragoli-1
8	NH/SH/Locality Locality- Taragoli	
9	Length (m)	22
10	Width (m)	100
11	Height (m)	20
12	Area (m)	2200
13	Depth (m)	5
14	Volume (m)	11000
15	Run out distance (m)	Nil
16	Type of Material	Debris
17	Type of movement	Slide
18	Rate of movement	Slow
19	Activity	Active
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Deep translational Failure
23	History	July 2019
24	Geomorphology	Lowly dissected hills
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	Sparse vegetation
28	Hydrological condition	Dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Forest
36	Geo-scientific Causes	Continuous rain fall increased the pore water pressure, presence of thick overburden in the steep slope and toe cut by the stream are other causes.
37	Remedial measures	Removal of the debris, proper benching, construction of channel wall and applying Geo jute or planting of suitable grass. Avoid construction top of the crown.

38	Remarks, if any	Nil
39	Summary/Abstract	Main causes for the slide are rainfall and steep slope, thick overburden material. To avoid failure the following measures are recommended removal of the debris, proper benching, construction of channel wall and applying Geo jute or planting of suitable grass.
40	Date of Reporting	28-11-2019
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



1851

S. No.	Slide No.	42
1	Slide No.	KAR/SG/48O1/2019/42
2	Latitude (N)	13.759
3	Longitude (E)	75.2483
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Puttalikoppa
8	NH/SH/Locality Locality- Puttalikoppa	
9	Length (m)	10
10	Width (m)	30
11	Height (m)	8
12	Area (m)	300
13	Depth (m)	3
14	Volume (m)	900
15	Run out distance (m)	Nil
16	Type of Material	Soil
17	Type of movement	slide
18	Rate of movement	Slow
19	Activity	suspended
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Lowly dissected hills
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	Thick vegetation
28	Hydrological condition	Dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Agriculture
36	Geo-scientific Causes	Continuous rain fall increased the pore water pressure, presence of thick overburden aided in failure.
37	Remedial measures	Proper benching and maintaining drainage will reduce the future failure.
38	Remarks, if any	Slope was modified for the cultivation
39	Summary/Abstract	Main causes for the slide are continuous rain fall and increase in the pore water pressure, presence of thick

		overburden. Proper benching and maintaining drainage will reduce the future failure.
40	Date of Reporting	28-11-2019
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	43
1	Slide No.	KAR/SG/48O1/2019/43
2	Latitude (N)	13.7771
3	Longitude (E)	75.2343
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Guddekoppa
8	NH/SH/Locality Locality-	Guddekoppa
9	Length (m)	20
10	Width (m)	20
11	Height (m)	14
12	Area (m)	400
13	Depth (m)	3
14	Volume (m)	1200
15	Run out distance (m)	Nil
16	Type of Material	Soil
17	Type of movement	slide
18	Rate of movement	Slow
19	Activity	suspended
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Lowly dissected hills
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	Thick vegetation
28	Hydrological condition	Damp
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Forest
36	Geo-scientific Causes	Steep slope with thick insitu soil, incessant rainfall, toe cut are some of the causes.
37	Remedial measures	Easing of the slope and lining of the drainage.
38	Remarks, if any	Nil
39	Summary/Abstract	Main causes for the slide are steep slope with thick insitu soil, incessant rainfall, toe cut by flowing stream. Proper benching and maintaining drainage will reduce the future

		failure.
40	Date of Reporting	29-11-2019
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	44
1	Slide No.	KAR/SG/48O1/2019/44
2	Latitude (N)	13.7779
3	Longitude (E)	75.2335
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Guddekoppa-1
8	NH/SH/LocalityLocality- Guddekoppa	
9	Length (m)	12
10	Width (m)	13
11	Height (m)	9
12	Area (m)	156
13	Depth (m)	2.5
14	Volume (m)	390
15	Run out distance (m)	Nil
16	Type of Material	Rock
17	Type of movement	slide
18	Rate of movement	Rapid
19	Activity	Active
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Lowly dissected hills
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	Thick vegetation
28	Hydrological condition	Damp
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Agriculture
36	Geo-scientific Causes	Presence of three sets of joins and water percolation lead to failure of the slope, toe cut by stream aided in failure.
37	Remedial measures	Removal of the debris, lining of the toe and easing of the slope will reduce the further slope failure
38	Remarks, if any	Nil
39	Summary/Abstract	Main causes for the slide are presence of three sets of

		joins and water percolation lead to failure of the slope, toe cut by stream aided in failure.
40	Date of Reporting	29-11-2019
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	45
1	Slide No.	KAR/SG/48O1/2019/45
2	Latitude (N)	13.7784
3	Longitude (E)	75.2328
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Guddekoppa-2
8	NH/SH/Locality Locality-	Guddekoppa
9	Length (m)	30
10	Width (m)	40
11	Height (m)	20
12	Area (m)	1200
13	Depth (m)	5
14	Volume (m)	6000
15	Run out distance (m)	Nil
16	Type of Material	Debris
17	Type of movement	slide
18	Rate of movement	Rapid
19	Activity	Active
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Deep translational Failure
23	History	Aug 2019
24	Geomorphology	Lowly dissected hills
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	Thick vegetation
28	Hydrological condition	Damp
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Forest
36	Geo-scientific Causes	Steep slope and weak overburden material and incessant rain fall are the main factors.
37	Remedial measures	Removal of the debris and lining of the stream.
38	Remarks, if any	Nil
39	Summary/Abstract	Main causes for the slide are steep slope and weak overburden material and incessant rain fall. Removal of

		the debris and lining of the stream is recommended.
40	Date of Reporting	29-11-2019
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	46
1	Slide No.	KAR/SG/48O1/2019/46
2	Latitude (N)	13.7797
3	Longitude (E)	75.2316
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Talluru
8	NH/SH/Locality	Locality- Talluru
9	Length (m)	15
10	Width (m)	11
11	Height (m)	13
12	Area (m)	165
13	Depth (m)	4
14	Volume (m)	660
15	Run out distance (m)	Nil
16	Type of Material	Debris
17	Type of movement	slide
18	Rate of movement	Rapid
19	Activity	Reactivated
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Lowly dissected hills
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	Thick vegetation
28	Hydrological condition	Damp
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Forest
36	Geo-scientific Causes	Incessant rainfall, thick overburden in the steep slope and toe cut by drainage.
37	Remedial measures	Construction of channel wall and removal of the debris, easing of the slope.
38	Remarks, if any	Nil
39	Summary/Abstract	Pore water pressure increased by incessant rainfall, the

		water level increased in the channel which leads to toe cut of the slope.
40	Date of Reporting	29-11-2019
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	47
1	Slide No.	KAR/SG/48O1/2019/47
2	Latitude (N)	13.8452
3	Longitude (E)	75.2173
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Shankarahalli
8	NH/SH/Locality Locality- Shankarahalli	
9	Length (m)	7
10	Width (m)	8
11	Height (m)	5
12	Area (m)	56
13	Depth (m)	3
14	Volume (m)	168
15	Run out distance (m)	Nil
16	Type of Material	Soil
17	Type of movement	Slide
18	Rate of movement	Slow
19	Activity	suspended
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Rolling plain
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	High height plantation
28	Hydrological condition	Dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Forest
36	Geo-scientific Causes	Incessant rainfall, thick overburden in the steep slope and toe cut by drainage.
37	Remedial measures	Maintenance of drainage
38	Remarks, if any	Nil
39	Summary/Abstract	This soil slide initiated on Aug 2019 by incessant rainfall.

40	Date of Reporting	02-12-2019
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	48
1	Slide No.	KAR/SG/48O1/2019/48
2	Latitude (N)	13.9313
3	Longitude (E)	75.2037
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Karagodu-1
8	NH/SH/Locality Locality- Karagodu	
9	Length (m)	15
10	Width (m)	13
11	Height (m)	7
12	Area (m)	195
13	Depth (m)	4
14	Volume (m)	780
15	Run out distance (m)	Nil
16	Type of Material	Debris
17	Type of movement	slide
18	Rate of movement	Slow
19	Activity	Reactivated
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Rolling plain
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	Moderate vegetation
28	Hydrological condition	Dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Forest
36	Geo-scientific Causes	Continuous rainfall, weak slope forming material, steep slope and toe cut are the main causative factors.
37	Remedial measures	Maintain the original stream course, the debris should be cleaned and easing of the slope will reduce the future failure.
38	Remarks, if any	Nil

39	Summary/Abstract	The debris slide initiated due to incessant rainfall and toe cut by the stream. To reduce the failure it is recommended that lining of stream, easing of the slope.
40	Date of Reporting	02-12-2019
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	49
1	Slide No.	KAR/SG/48O1/2019/49
2	Latitude (N)	13.9364
3	Longitude (E)	75.2067
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Karagodu
8	NH/SH/LocalityLocality- Karagodu	
9	Length (m)	10
10	Width (m)	30
11	Height (m)	5
12	Area (m)	300
13	Depth (m)	2.5
14	Volume (m)	750
15	Run out distance (m)	Nil
16	Type of Material	Soil
17	Type of movement	slide
18	Rate of movement	Slow
19	Activity	Reactivated
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	19-Aug
24	Geomorphology	Lowly dissected slope
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	Thick vegetation
28	Hydrological condition	Dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Forest
36	Geo-scientific Causes	Toe cut by the stream, continuous rainfall, and weak thick overburden in the steep slope.
37	Remedial measures	Removal of the debris and construction of channel wall.
38	Remarks, if any	Nil
39	Summary/Abstract	The slide initiated in the rolling plane with steep slope.

40	Date of Reporting	03-12-2019
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	50
1	Slide No.	KAR/SG/48O1/2019/50
2	Latitude (N)	13.9306
3	Longitude (E)	75.1347
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Muttururu
8	NH/SH/Locality	SH-52
9	Length (m)	12
10	Width (m)	35
11	Height (m)	10
12	Area (m)	420
13	Depth (m)	1
14	Volume (m)	420
15	Run out distance (m)	Nil
16	Type of Material	Debris
17	Type of movement	slide
18	Rate of movement	Slow
19	Activity	Reactivated
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	19-Aug
24	Geomorphology	Extensive slope cut
25	Geology/Lithology	Amphibolite
26	Structure	Nil
27	Landuse/ Landcover	Moderate vegetation
28	Hydrological condition	Dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Forest
36	Geo-scientific Causes	Toe disturbed for road construction.
37	Remedial measures	The constructed retaining wall sufficient but weep holes are blocked. That should be maintained properly.
38	Remarks, if any	At the top of the slide recent movement observed.
39	Summary/Abstract	The slide initiated on the lowly dissected slope by cutting of the slope for construction of road widening.

40	Date of Reporting	11-12-2019
41	Landslide Category	Category-II
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	51
1	Slide No.	KAR/SG/48O1/2019/51
2	Latitude (N)	13.8679
3	Longitude (E)	75.0611
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Haniya
8	NH/SH/Locality	SH-52
9	Length (m)	10
10	Width (m)	20
11	Height (m)	8
12	Area (m)	200
13	Depth (m)	1
14	Volume (m)	200
15	Run out distance (m)	Nil
16	Type of Material	Soil
17	Type of movement	slide
18	Rate of movement	Slow
19	Activity	Reactivated
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	19-Aug
24	Geomorphology	Moderately dissected slope
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	High height plantation
28	Hydrological condition	Dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Forest
36	Geo-scientific Causes	Slope angle modified for the road construction.
37	Remedial measures	Easing of the slope and construction of retaining wall with sufficient weep holes.
38	Remarks, if any	Just below the cutslope electrical pole is seen.
39	Summary/Abstract	The slide initiated on the lowly dissected slope by cutting of the slope for construction of road.

40	Date of Reporting	11-12-2019
41	Landslide Category	Category-II
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	52
1	Slide No.	KAR/SG/48O1/2019/52
2	Latitude (N)	13.8489
3	Longitude (E)	75.0639
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Arodi
8	NH/SH/Locality	SH-52
9	Length (m)	5
10	Width (m)	15
11	Height (m)	4
12	Area (m)	75
13	Depth (m)	0.5
14	Volume (m)	37.5
15	Run out distance (m)	Nil
16	Type of Material	Soil
17	Type of movement	slide
18	Rate of movement	Slow
19	Activity	Reactivated
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	19-Aug
24	Geomorphology	Moderately dissected slope
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	Extensive slope cut
28	Hydrological condition	Dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Forest
36	Geo-scientific Causes	Slope angle modified for the road construction.
37	Remedial measures	Easing of the slope and construction of retaining wall with sufficient weep holes.
38	Remarks, if any	Nil
39	Summary/Abstract	The slide initiated on the lowly dissected slope by cutting of the slope for construction of road.

40	Date of Reporting	11-12-2019
41	Landslide Category	Category-II
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	53
1	Slide No.	KAR/SG/48O1/2019/53
2	Latitude (N)	13.8474
3	Longitude (E)	75.0643
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Arodi-1
8	NH/SH/Locality	SH-52
9	Length (m)	8
10	Width (m)	12
11	Height (m)	6
12	Area (m)	96
13	Depth (m)	1
14	Volume (m)	96
15	Run out distance (m)	Nil
16	Type of Material	Soil
17	Type of movement	slide
18	Rate of movement	Slow
19	Activity	Reactivated
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	19-Aug
24	Geomorphology	Moderately dissected slope
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	Thick vegetation
28	Hydrological condition	Dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Forest
36	Geo-scientific Causes	Slope angle modified for the road construction.
37	Remedial measures	Easing of the slope and construction of retaining wall with sufficient weep holes.
38	Remarks, if any	Nil
39	Summary/Abstract	The slide initiated on the lowly dissected slope by cutting of the slope for construction of road.

40	Date of Reporting	11-12-2019
41	Landslide Category	Category-II
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	54
1	Slide No.	KAR/SG/48O1/2019/54
2	Latitude (N)	13.8381
3	Longitude (E)	75.0075
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Ebbegodu
8	NH/SH/Locality	Road connecting Nagara and Brahmanwada
9	Length (m)	8
10	Width (m)	10
11	Height (m)	8
12	Area (m)	80
13	Depth (m)	0.5
14	Volume (m)	40
15	Run out distance (m)	Nil
16	Type of Material	Soil
17	Type of movement	slide
18	Rate of movement	Slow
19	Activity	Active
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Moderately dissected slope
25	Geology/Lithology	Metabasalt
26	Structure	Nil
27	Landuse/ Landcover	Thick vegetation
28	Hydrological condition	Dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Forest
36	Geo-scientific Causes	Slope angle modified for the road construction.
37	Remedial measures	Easing of the slope and construction of retaining wall with sufficient weep holes.
38	Remarks, if any	Electrical pole present at the top of the slide area.
39	Summary/Abstract	The slide initiated on the lowly dissected slope by cutting of the slope for construction of road.

40	Date of Reporting	11-12-2019
41	Landslide Category	Category-II
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	55
1	Slide No.	KAR/SG/48O1/2019/55
2	Latitude (N)	13.8356
3	Longitude (E)	75.1615
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Hulisara
8	NH/SH/Locality	Locality-Hulisara
9	Length (m)	18
10	Width (m)	100
11	Height (m)	15
12	Area (m)	1800
13	Depth (m)	1
14	Volume (m)	1800
15	Run out distance (m)	Nil
16	Type of Material	Debris
17	Type of movement	slide
18	Rate of movement	Slow
19	Activity	Active
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Lowly dissected slope
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	High height plantation
28	Hydrological condition	Dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Agriculture
36	Geo-scientific Causes	Steep slope, thick overburden in the vertical slope, increase of the pore water pressure and toe cut by the Drainage.
37	Remedial measures	Easing of the slope and channel wall to reduce the toe cut by the stream.
38	Remarks, if any	Nil

39	Summary/Abstract	The slide occurred steep slope on the lowly dissected hills.
40	Date of Reporting	12-12-2019
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	56
1	Slide No.	KAR/SG/48O1/2019/56
2	Latitude (N)	13.8357
3	Longitude (E)	75.191
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Mudali
8	NH/SH/LocalityLocality-Mudali	
9	Length (m)	20
10	Width (m)	20
11	Height (m)	10
12	Area (m)	400
13	Depth (m)	3
14	Volume (m)	1200
15	Run out distance (m)	Nil
16	Type of Material	Soil
17	Type of movement	slide
18	Rate of movement	Slow
19	Activity	Reactivated
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Rolling plain
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	High height plantation
28	Hydrological condition	Dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Forest
36	Geo-scientific Causes	Toe cut by the stream and pore pressure development in the soil due to incessant rain fall.
37	Remedial measures	Channel wall to reduce the toe cut by the stream.
38	Remarks, if any	Nil
39	Summary/Abstract	Toe cut by the stream and pore pressure development in the soil due to incessant rain fall. Channel wall to reduce the

		toe cut by the stream.
40	Date of Reporting	24-12-2019
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	57
1	Slide No.	KAR/SG/48O1/2019/57
2	Latitude (N)	13.843
3	Longitude (E)	75.1703
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Hosagadde
8	NH/SH/LocalityLocality-Hosagadde	
9	Length (m)	25
10	Width (m)	100
11	Height (m)	15
12	Area (m)	2500
13	Depth (m)	4
14	Volume (m)	10000
15	Run out distance (m)	Nil
16	Type of Material	Debris
17	Type of movement	slide
18	Rate of movement	Slow
19	Activity	Reactivated
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Rolling plain
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	Sparse vegetation
28	Hydrological condition	Dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Agriculture
36	Geo-scientific Causes	Toe cut by the stream and pore pressure development in the soil due to incessant rain fall.
37	Remedial measures	Reducing the slope angle by benching with proper height and width. Construct channel wall to reduce the toe cut by the stream.
38	Remarks, if any	At the time of rainfall, channel was blocked by slide and the water rushed into cultivated land.

39	Summary/Abstract	Slide occurred on the lowly dissected vertical slope. Toe cut by the stream and pore pressure development in the soil due to incessant rain fall. Reducing the slope angle by benching with proper height and width. Channel wall to reduce the toe cut by the stream.
40	Date of Reporting	25-12-2019
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	58
1	Slide No.	KAR/SG/48O1/2019/58
2	Latitude (N)	13.8578
3	Longitude (E)	75.1637
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Yelladakone
8	NH/SH/LocalityLocality-Yelladakone	
9	Length (m)	10
10	Width (m)	150
11	Height (m)	6
12	Area (m)	1500
13	Depth (m)	1
14	Volume (m)	1500
15	Run out distance (m)	Nil
16	Type of Material	Soil
17	Type of movement	slide
18	Rate of movement	Slow
19	Activity	Reactivated
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Rolling plain
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	Sparse vegetation
28	Hydrological condition	Dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Agriculture
36	Geo-scientific Causes	Toe cut by the stream and pore pressure development in the soil due to incessant rain fall. Thick overburden on the steep slope.
37	Remedial measures	Reducing the slope angle by benching with proper height and width. Construct channel wall to reduce the toe cut by the stream.

38	Remarks, if any	
39	Summary/Abstract	Slide occurred on gentle sloping area. Toe cut by the stream and pore pressure development in the soil due to incessant rain fall. Thick overburden on the steep slope. Reducing the slope angle by benching with proper height and width. Construct channel wall to reduce the toe cut by the stream.
40	Date of Reporting	25-12-2019
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	59
1	Slide No.	KAR/SG/48O1/2019/59
2	Latitude (N)	13.7975
3	Longitude (E)	75.1474
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Nerale
8	NH/SH/Locality Locality-Nerale	
9	Length (m)	20
10	Width (m)	25
11	Height (m)	8
12	Area (m)	500
13	Depth (m)	5
14	Volume (m)	2500
15	Run out distance (m)	Nil
16	Type of Material	Debris
17	Type of movement	slide
18	Rate of movement	Slow
19	Activity	Active
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Deep translational Failure
23	History	Aug 2019
24	Geomorphology	Moderately dissected slope
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	Thick vegetation
28	Hydrological condition	Dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Agriculture
36	Geo-scientific Causes	Weak slope forming material and incessant rainfall caused the pore water pressure development.
37	Remedial measures	Clearing of the debris from the slide area and easing of the slope, applying geo-jute/ natural plantations in the slide area.
38	Remarks, if any	

39	Summary/Abstract	Slide occurred on the lowly dissected slope.
40	Date of Reporting	27-12-2019
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	60
1	Slide No.	KAR/SG/48O1/2019/60
2	Latitude (N)	13.8092
3	Longitude (E)	75.1263
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Hiregadde-1
8	NH/SH/Locality	Road connecting Karagadi and Nerale
9	Length (m)	8
10	Width (m)	10
11	Height (m)	6
12	Area (m)	80
13	Depth (m)	0.5
14	Volume (m)	40
15	Run out distance (m)	Nil
16	Type of Material	Soil
17	Type of movement	slide
18	Rate of movement	Slow
19	Activity	Active
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Moderately dissected slope
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	Thick vegetation
28	Hydrological condition	Dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Forest
36	Geo-scientific Causes	Slope angle modified for the road construction.
37	Remedial measures	Easing of the slope and construction of retaining wall with sufficient weep holes.
38	Remarks, if any	
39	Summary/Abstract	slope modified for road construction

40	Date of Reporting	27-12-2019
41	Landslide Category	Category-II
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	61
1	Slide No.	KAR/SG/48O1/2019/61
2	Latitude (N)	13.8093
3	Longitude (E)	75.1247
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Hiregadde
8	NH/SH/Locality	Road connecting Karagadi and Nerale
9	Length (m)	7
10	Width (m)	14
11	Height (m)	6
12	Area (m)	98
13	Depth (m)	0.5
14	Volume (m)	49
15	Run out distance (m)	Nil
16	Type of Material	Debris
17	Type of movement	Slide
18	Rate of movement	Rapid
19	Activity	Active
20	Distribution	Widening
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	19-Aug
24	Geomorphology	Moderately dissected slope
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	Thick vegetation
28	Hydrological condition	Dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Forest
36	Geo-scientific Causes	Weak slope forming material disturbed for extension for road construction and the slope left vertically without any support. Incessant rainfall increased the pore pressure in the soil
37	Remedial measures	Construction of retaining wall or toe drain recommended.
38	Remarks, if any	Rill erosion observed on the slide material.
39	Summary/Abstract	Debris slide occurred on the very gentle slope due to

		cutting of slope for construction of road. Construction of retaining wall or toe drain recommended.
40	Date of Reporting	27-12-2019
41	Landslide Category	Category-II
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	62
1	Slide No.	KAR/SG/48O1/2019/62
2	Latitude (N)	13.839
3	Longitude (E)	75.1518
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Hanagodu
8	NH/SH/Locality Locality-Hanagodu	
9	Length (m)	10
10	Width (m)	25
11	Height (m)	6
12	Area (m)	250
13	Depth (m)	1
14	Volume (m)	250
15	Run out distance (m)	Nil
16	Type of Material	Debris
17	Type of movement	Slide
18	Rate of movement	Rapid
19	Activity	Active
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Rolling plain
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	Thick vegetation
28	Hydrological condition	Damp
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Agriculture
36	Geo-scientific Causes	Thick and weak slope forming material exposed on the vertical slope and the SFM eroded by stream during the incessant rainfall.
37	Remedial measures	Construction of channel wall.
38	Remarks, if any	Nil
39	Summary/Abstract	Debris slide occurred adjacent to the cultivation.

		Construction of channel wall recommended.
40	Date of Reporting	28-12-2019
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	63
1	Slide No.	KAR/SG/48O1/2019/63
2	Latitude (N)	13.8397
3	Longitude (E)	75.1614
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Hulisara-1
8	NH/SH/LocalityLocality-Hulisara	
9	Length (m)	25
10	Width (m)	50
11	Height (m)	15
12	Area (m)	1250
13	Depth (m)	4
14	Volume (m)	5000
15	Run out distance (m)	Nil
16	Type of Material	Soil
17	Type of movement	Slide
18	Rate of movement	Slow
19	Activity	Reactivated
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Lowly dissected slope
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	Sparse vegetation
28	Hydrological condition	dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Agriculture
36	Geo-scientific Causes	Thick and weak slope forming material exposed on the vertical slope and the SFM eroded by stream during the incessant rainfall.
37	Remedial measures	Removal of the debris to regularize stream flow and easing of the slope at necessary locations.
38	Remarks, if any	Nil

39	Summary/Abstract	Thick overburden exposed on the steep slope and continuous rainfall is the main factors initiated the landslide. Removal of the debris to regularize stream flow and easing of the slope at necessary locations.
40	Date of Reporting	28-12-2019
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	64
1	Slide No.	KAR/SG/48O1/2019/64
2	Latitude (N)	13.8606
3	Longitude (E)	75.1496
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Sonale
8	NH/SH/Locality	Road connecting Nivane and Sonale
9	Length (m)	12
10	Width (m)	12
11	Height (m)	8
12	Area (m)	144
13	Depth (m)	4
14	Volume (m)	576
15	Run out distance (m)	Nil
16	Type of Material	Debris
17	Type of movement	Slide
18	Rate of movement	Slow
19	Activity	Active
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Lowly dissected slope
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	Moderate vegetation
28	Hydrological condition	dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Road blocked for one day
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Forest
36	Geo-scientific Causes	Weak slope forming (boulders and insitu-soil) lying on the slope and the slope modified for road construction without any prior mitigation.
37	Remedial measures	Removal of the debris, easing of the slope or construction of retaining wall with proper weep holes.
38	Remarks, if any	Slide may get reactivate.
39	Summary/Abstract	Debris slide occurred on the lowly dissected slope. Weak

		slope forming (boulders and insitu-soil) lying on the slope and the slope modified for road construction without prior mitigation.
40	Date of Reporting	28-12-2019
41	Landslide Category	Category-II
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	65
1	Slide No.	KAR/SG/48O1/2019/65
2	Latitude (N)	13.8698
3	Longitude (E)	75.1397
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Kolagi
8	NH/SH/Locality	Road connecting Alagaru and Sonale
9	Length (m)	15
10	Width (m)	25
11	Height (m)	12
12	Area (m)	375
13	Depth (m)	1
14	Volume (m)	375
15	Run out distance (m)	Nil
16	Type of Material	Soil
17	Type of movement	Slide
18	Rate of movement	Slow
19	Activity	Reactivated
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Rolling plain
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	Moderate vegetation
28	Hydrological condition	dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Road damaged.
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Forest
36	Geo-scientific Causes	Thick slope forming material on the vertical slope and toe cut by the stream.
37	Remedial measures	Easing of the slope and realignment of the village link road.
38	Remarks, if any	Part of the road washed away. Stream course changed by landslide.

39	Summary/Abstract	Steep slope coupled with weak slope forming material and toe cut by the stream are prime causes for the slide.
40	Date of Reporting	28-12-2019
41	Landslide Category	Category-II
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	66
1	Slide No.	KAR/SG/48O1/2019/66
2	Latitude (N)	13.8761
3	Longitude (E)	75.13314
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Varamballi
8	NH/SH/Locality Locality-	Varamballi
9	Length (m)	10
10	Width (m)	12
11	Height (m)	6
12	Area (m)	120
13	Depth (m)	0.5
14	Volume (m)	60
15	Run out distance (m)	Nil
16	Type of Material	Soil
17	Type of movement	Slide
18	Rate of movement	Slow
19	Activity	Reactivated
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Rolling plain
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	Moderate vegetation
28	Hydrological condition	dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Agriculture
36	Geo-scientific Causes	Weak slope forming material and toe cut by the stream.
37	Remedial measures	Construction of Channel wall or retaining wall
38	Remarks, if any	Nil
39	Summary/Abstract	Landslide happened on very gentle slope due to toe cut by the stream.

40	Date of Reporting	28-12-2019
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	67
1	Slide No.	KAR/SG/48O1/2019/67
2	Latitude (N)	13.8442
3	Longitude (E)	75.1424
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Borikoppa-1
8	NH/SH/LocalityLocality- Borikoppa	
9	Length (m)	10
10	Width (m)	30
11	Height (m)	7
12	Area (m)	300
13	Depth (m)	3
14	Volume (m)	900
15	Run out distance (m)	Nil
16	Type of Material	Debris
17	Type of movement	Slide
18	Rate of movement	Slow
19	Activity	Reactivated
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Lowly dissected slope
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	Moderate vegetation
28	Hydrological condition	dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Agriculture
36	Geo-scientific Causes	Weak slope forming material and toe cut by the stream.
37	Remedial measures	Removal of the debris and hanging trees, regularizing the stream flow, easing of the slope.
38	Remarks, if any	Nil
39	Summary/Abstract	Presence of thick slope forming material in the steep slope and toe cut by the stream are the causes for slide.

		Removal of the debris and hanging trees, regularizing the stream flow, easing of the slope can minimize the slope failure.
40	Date of Reporting	28-12-2019
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	68
1	Slide No.	KAR/SG/48O1/2019/68
2	Latitude (N)	13.8436
3	Longitude (E)	75.1422
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Borikoppa
8	NH/SH/Locality Locality- Borikoppa	
9	Length (m)	20
10	Width (m)	50
11	Height (m)	15
12	Area (m)	1000
13	Depth (m)	6
14	Volume (m)	6000
15	Run out distance (m)	Nil
16	Type of Material	Debris
17	Type of movement	Slide
18	Rate of movement	Slow
19	Activity	Reactivated
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Deep translational Failure
23	History	Aug 2019
24	Geomorphology	Lowly dissected slope
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	High height plantation
28	Hydrological condition	dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Forest
36	Geo-scientific Causes	Incessant rainfall increased the pore pressure in thick weak slope forming material which is exposed on vertical slope.
37	Remedial measures	Avoid disturbing of the slope and construction of channel wall will reduce the further slope failure.
38	Remarks, if any	Nil

39	Summary/Abstract	Slope modification should be avoided and construction of channel wall will reduce the further slope failure.
40	Date of Reporting	28-12-2019
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	69
1	Slide No.	KAR/SG/48O1/2019/69
2	Latitude (N)	13.808
3	Longitude (E)	75.1578
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Lagadamane
8	NH/SH/Locality Locality- Lagadamane	
9	Length (m)	20
10	Width (m)	70
11	Height (m)	15
12	Area (m)	1400
13	Depth (m)	1
14	Volume (m)	1400
15	Run out distance (m)	Nil
16	Type of Material	Debris
17	Type of movement	Slide
18	Rate of movement	Slow
19	Activity	Reactivated
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Moderately dissected slope
25	Geology/Lithology	Quartz-Chlorite Schist
26	Structure	Nil
27	Landuse/ Landcover	High height vegetation
28	Hydrological condition	dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Agriculture
36	Geo-scientific Causes	Thick weak slope forming material in the vertical slope which was toe cut/scoured by stream, due to incessant rainfall the pore pressure increased and the slope failed.
37	Remedial measures	Easing of the slope by proper benching and construction of channel wall.
38	Remarks, if any	Nil
39	Summary/Abstract	Landslide occurred on the lowly dissected slope. Easing

		of the slope by proper benching and construction of channel wall.
40	Date of Reporting	28-12-2019
41	Landslide Category	Category-II
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	70
1	Slide No.	KAR/SG/48O1/2019/70
2	Latitude (N)	13.8694
3	Longitude (E)	75.0871
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Goragal
8	NH/SH/Locality Locality- Goragal	
9	Length (m)	8
10	Width (m)	20
11	Height (m)	6
12	Area (m)	160
13	Depth (m)	2
14	Volume (m)	320
15	Run out distance (m)	Nil
16	Type of Material	Debris
17	Type of movement	Slide
18	Rate of movement	Slow
19	Activity	Active
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	19-Aug year
24	Geomorphology	Rolling plain
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	Settlement on modified slope
28	Hydrological condition	dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Agriculture
36	Geo-scientific Causes	The slope modified for settlement and slope left as vertically without any remedial measures.
37	Remedial measures	Construction of Retaining wall with proper weep holes and toe drain is recommended.
38	Remarks, if any	Slide occurred adjacent to the settlement.
39	Summary/Abstract	The slope modified for settlement and slope left as vertical cut without ant remedial measures. Construction

		of Retaining wall with proper weep holes and toe drain is recommended.
40	Date of Reporting	28-12-2019
41	Landslide Category	Category-II
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	71
1	Slide No.	KAR/SG/48O1/2019/71
2	Latitude (N)	13.8523
3	Longitude (E)	75.0998
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Nagarakudige
8	NH/SH/Locality Road connecting Trineve and Talanari	
9	Length (m)	10
10	Width (m)	10
11	Height (m)	7
12	Area (m)	100
13	Depth (m)	3
14	Volume (m)	300
15	Run out distance (m)	Nil
16	Type of Material	Debris
17	Type of movement	Slide
18	Rate of movement	Slow
19	Activity	Active
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Moderately dissected slope
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	Thick vegetation
28	Hydrological condition	dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Forest
36	Geo-scientific Causes	Weak slope forming material disturbed for extension for road construction and the slope left as vertical cut without any support. Incessant rainfall increased the pore pressure in the soil
37	Remedial measures	Removal of the material, construction of retaining wall or toe drain recommended.

38	Remarks, if any	Nil
39	Summary/Abstract	Debris slide occurred on the lowly dissected slope due to cutting of slope for construction of road. Construction of retaining wall or toe drain recommended.
40	Date of Reporting	28-12-2019
41	Landslide Category	Category-II
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	72
1	Slide No.	KAR/SG/48O1/2019/72
2	Latitude (N)	13.8522
3	Longitude (E)	75.1113
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Talanari
8	NH/SH/LocalityLocality- Talanari	
9	Length (m)	12
10	Width (m)	80
11	Height (m)	7
12	Area (m)	960
13	Depth (m)	2
14	Volume (m)	1920
15	Run out distance (m)	Nil
16	Type of Material	Debris
17	Type of movement	Slide
18	Rate of movement	Slow
19	Activity	Reactivated
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Moderately dissected slope
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	High height plantation
28	Hydrological condition	dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Agriculture
36	Geo-scientific Causes	Thick weak slope forming material in the vertical slope which was toe cut/scoured by stream, due to incessant rainfall the pore pressure increased and the slope failed.
37	Remedial measures	Construction of channel wall will reduce the further slope failure.
38	Remarks, if any	At the top of the slide cracks are observed. It may

		reactivate during the next monsoon.
39	Summary/Abstract	Failure happened on the very gentle slope. The dimension of the slide is very less and it is initiated adjacent to the cultivation.
40	Date of Reporting	28-12-2019
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	73
1	Slide No.	KAR/SG/48O1/2019/73
2	Latitude (N)	13.7932
3	Longitude (E)	75.1934
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Hanukoppa
8	NH/SH/Locality Locality- Hanukoppa	
9	Length (m)	12
10	Width (m)	55
11	Height (m)	10
12	Area (m)	660
13	Depth (m)	0.5
14	Volume (m)	330
15	Run out distance (m)	Nil
16	Type of Material	Debris
17	Type of movement	Slide
18	Rate of movement	Slow
19	Activity	Reactivated
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Moderately dissected slope
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	Moderate vegetation
28	Hydrological condition	dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Agriculture
36	Geo-scientific Causes	Highly weathered rock exposed on the steep slope coupled with the incessant rainfall and toe cut are the causes for the slide
37	Remedial measures	Construction of channel wall and easing of the slope will reduce the further slope failure.
38	Remarks, if any	Nil

39	Summary/Abstract	Highly weathered rock exposed on the steep slope coupled with the incessant rainfall and toe cut are the causes for the slide. Construction of channel wall and easing of the slope will reduce the further slope failure.
40	Date of Reporting	29-12-2019
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	74
1	Slide No.	KAR/SG/48O1/2019/74
2	Latitude (N)	13.7859
3	Longitude (E)	75.115
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Kodurutenkabailu
8	NH/SH/Locality Locality-	Kodurutenkabailu
9	Length (m)	20
10	Width (m)	35
11	Height (m)	15
12	Area (m)	700
13	Depth (m)	1
14	Volume (m)	700
15	Run out distance (m)	Nil
16	Type of Material	Debris
17	Type of movement	Slide
18	Rate of movement	Slow
19	Activity	Active
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Moderately dissected slope
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	Settlement on modified slope
28	Hydrological condition	dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Agriculture
36	Geo-scientific Causes	The lowly dissected slope modified for settlement and slope left as vertical cut without any remedial measures.
37	Remedial measures	Easing of the slope, construction of retaining wall with proper weep holes and toe drain is recommended.
38	Remarks, if any	Slide occurred adjacent to the settlement.
39	Summary/Abstract	The lowly dissected slope modified for settlement and

		slope left as vertical cut without any remedial measures. Easing of the slope, construction of retaining wall with proper weep holes and toe drain is recommended.
40	Date of Reporting	29-12-2019
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	75
1	Slide No.	KAR/SG/48O1/2019/75
2	Latitude (N)	13.7879
3	Longitude (E)	75.115
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Baise
8	NH/SH/LocalityLocality- Baise	
9	Length (m)	10
10	Width (m)	15
11	Height (m)	8
12	Area (m)	150
13	Depth (m)	1
14	Volume (m)	150
15	Run out distance (m)	Nil
16	Type of Material	Debris
17	Type of movement	Slide
18	Rate of movement	Slow
19	Activity	Active
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Moderately dissected slope
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	Sparse vegetation
28	Hydrological condition	Dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Agriculture
36	Geo-scientific Causes	Weak slope forming material, incessant rainfall and toe cut by the stream.
37	Remedial measures	Clearing of the debris and construction of channel wall.
38	Remarks, if any	Nil
39	Summary/Abstract	Weak slope forming material, incessant rainfall and toe cut by the stream. Clearing of the debris and construction

		of channel wall.
40	Date of Reporting	29-12-2019
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	76
1	Slide No.	KAR/SG/48O5/2019/76
2	Latitude (N)	13.7877
3	Longitude (E)	75.1166
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Baise-1
8	NH/SH/Locality	Road connecting Kodurutenkabailu and Baise
9	Length (m)	18
10	Width (m)	8
11	Height (m)	12
12	Area (m)	144
13	Depth (m)	3
14	Volume (m)	432
15	Run out distance (m)	Nil
16	Type of Material	Debris
17	Type of movement	Slide
18	Rate of movement	Slow
19	Activity	Active
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	19-Aug
24	Geomorphology	Moderately dissected slope
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	Thick vegetation
28	Hydrological condition	dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Forest
36	Geo-scientific Causes	Weak slope forming material disturbed for extension of road construction and the slope left as vertical cut without any support. Incessant rainfall increased the pore pressure in the soil.
37	Remedial measures	Removal of the material, Construction of retaining wall or toe drain recommended.
38	Remarks, if any	Nil

39	Summary/Abstract	Debris slide occurred on the lowly dissected slope due to cutting of slope for construction of road. Construction of retaining wall or toe drain recommended.
40	Date of Reporting	29-12-2019
41	Landslide Category	Category-II
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	77
1	Slide No.	KAR/SG/48O5/2019/77
2	Latitude (N)	13.8264
3	Longitude (E)	75.0713
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Hilkunji
8	NH/SH/Locality Locality- Hilkunji	
9	Length (m)	25
10	Width (m)	25
11	Height (m)	19
12	Area (m)	625
13	Depth (m)	2
14	Volume (m)	1250
15	Run out distance (m)	Nil
16	Type of Material	Debris
17	Type of movement	Slide
18	Rate of movement	Slow
19	Activity	Reactivated
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Moderately dissected slope
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	High height plantation
28	Hydrological condition	dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Agriculture
36	Geo-scientific Causes	Thick weak slope forming material in the vertical steep slope, incessant rain fall are main causes.
37	Remedial measures	Easing of the slope is recommended.
38	Remarks, if any	Crown cracks are observed on the left flank which may lead to further failure.
39	Summary/Abstract	Thick weak slope forming material in the vertical steep slope, incessant rain fall. Crown cracks are observed on

		the left flank which may lead to further failure. Easing of the slope recommended.
40	Date of Reporting	01-01-2020
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K
		



S. No.	Slide No.	78
1	Slide No.	KAR/SG/48O5/2019/78
2	Latitude (N)	13.8247
3	Longitude (E)	75.0564
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Surugodu
8	NH/SH/Locality Locality- Surugodu	
9	Length (m)	12
10	Width (m)	15
11	Height (m)	10
12	Area (m)	180
13	Depth (m)	2
14	Volume (m)	360
15	Run out distance (m)	Nil
16	Type of Material	Debris
17	Type of movement	Slide
18	Rate of movement	Slow
19	Activity	Active
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Moderately dissected slope
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	Settlement on modified slope
28	Hydrological condition	dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Forest
36	Geo-scientific Causes	The slope modified for settlement and slope left as vertical cut without any remedial measures.
37	Remedial measures	Construction of retaining wall with proper weep holes and toe drain is recommended.
38	Remarks, if any	Slide occurred adjacent to the settlement and the settlement partially damaged.
39	Summary/Abstract	The slope modified for settlement and slope left as

		verticalcut without any remedial measures. Construction of retaining wall with proper weep holes and toe drain is recommended.
40	Date of Reporting	01-01-2020
41	Landslide Category	Category-II
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	79
1	Slide No.	KAR/SG/48O5/2019/79
2	Latitude (N)	13.8055
3	Longitude (E)	75.0867
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Beluru
8	NH/SH/Locality Locality- Beluru	
9	Length (m)	12
10	Width (m)	50
11	Height (m)	10
12	Area (m)	600
13	Depth (m)	0.5
14	Volume (m)	300
15	Run out distance (m)	Nil
16	Type of Material	Debris
17	Type of movement	Slide
18	Rate of movement	Slow
19	Activity	Active
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Rolling plain
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	Sparse vegetation
28	Hydrological condition	Dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Forest
36	Geo-scientific Causes	Weak slope forming material failed due to increase of the pore pressure and toe cut by the stream.
37	Remedial measures	Clearing of the debris and construction of channel wall.
38	Remarks, if any	Nil
39	Summary/Abstract	Weak slope forming material failed due to increase of the pore pressure and toe cut by the stream. Clearing of the debris and construction of channel wall.

40	Date of Reporting	01-01-2020
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	80
1	Slide No.	KAR/SG/48O5/2019/80
2	Latitude (N)	13.7777
3	Longitude (E)	75.1018
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Heggebailu
8	NH/SH/Locality	Road connecting Baise and Rave
9	Length (m)	25
10	Width (m)	80
11	Height (m)	20
12	Area (m)	2000
13	Depth (m)	3
14	Volume (m)	6000
15	Run out distance (m)	Nil
16	Type of Material	Debris
17	Type of movement	Slide
18	Rate of movement	Slow
19	Activity	Reactivated
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Rolling plain
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	Sparse vegetation
28	Hydrological condition	dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Forest
36	Geo-scientific Causes	Steep slope and weak slope forming material coupled with the incessant rainfall and toe cut by the stream are causes for the slide.
37	Remedial measures	Easing of the slope and construction of channel wall.
38	Remarks, if any	Due to the toe erosion the stream shifted towards the hill side. The slide is reactivating every year. One settlement located near to the crown portion should be evacuated.

39	Summary/Abstract	Steep slope and weak slope forming material coupled with the incessant rainfall and toe cut by the stream are the causes for the slide. Easing of the slope and construction of channel wall are recommended. Due to the toe erosion the stream shifted towards the hill side. The slide is reactivating every year. One settlement located near to the crown portion should be evacuated.
40	Date of Reporting	01-01-2020
41	Landslide Category	Category-II
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	81
1	Slide No.	KAR/SG/48O5/2019/81
2	Latitude (N)	13.757
3	Longitude (E)	75.0723
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Edanala
8	NH/SH/LocalityLocality-Edanala	
9	Length (m)	12
10	Width (m)	40
11	Height (m)	8
12	Area (m)	480
13	Depth (m)	0.5
14	Volume (m)	240
15	Run out distance (m)	Nil
16	Type of Material	Debris
17	Type of movement	Slide
18	Rate of movement	rapid
19	Activity	Reactivated
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Moderately dissected slope
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	Thick vegetation
28	Hydrological condition	Dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Agriculture
36	Geo-scientific Causes	Thick weak slope forming material in vertical slope, incessant rainfall which increased the pore water pressure and toe cut by the flowing stream.
37	Remedial measures	Easing of the slope is recommended.
38	Remarks, if any	Nil
39	Summary/Abstract	Toe cut by 3rd order stream and steep slope are the main

		causes for the slide.
40	Date of Reporting	02-01-2020
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	82
1	Slide No.	KAR/SG/48O1/2019/82
2	Latitude (N)	13.7782
3	Longitude (E)	75.0417
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Hirinagadde
8	NH/SH/Locality	Locality-Hirinagadde
9	Length (m)	12
10	Width (m)	8
11	Height (m)	8
12	Area (m)	96
13	Depth (m)	2
14	Volume (m)	192
15	Run out distance (m)	Nil
16	Type of Material	Debris
17	Type of movement	Slide
18	Rate of movement	rapid
19	Activity	Active
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Moderately dissected slope
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	High height plantation
28	Hydrological condition	Dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Agriculture
36	Geo-scientific Causes	The presence of highly weathered phyllitic rock coupled with incessant rainfall which increased the pore water pressure.
37	Remedial measures	Removal of the debris, easing of the slope and lining of the stream are recommended.
38	Remarks, if any	Nil

39	Summary/Abstract	The presence of highly weathered phyllitic rock coupled with incessant rainfall which increased the pore water pressure is the main causes for the slide. Removal of the debris, easing of the slope and lining of the stream are recommended.
40	Date of Reporting	04-01-2020
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	83
1	Slide No.	KAR/SG/48O1/2019/83
2	Latitude (N)	13.7693
3	Longitude (E)	75.0447
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Asamane
8	NH/SH/Locality Locality-Asamane	
9	Length (m)	30
10	Width (m)	50
11	Height (m)	25
12	Area (m)	1500
13	Depth (m)	4
14	Volume (m)	6000
15	Run out distance (m)	Nil
16	Type of Material	Debris
17	Type of movement	Slide
18	Rate of movement	Slow
19	Activity	Reactivated
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Moderately dissected slope
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	Moderate vegetation
28	Hydrological condition	Dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Forest
36	Geo-scientific Causes	Thick overburden in the vertical slope and incessant rainfall which decreased the strength of the overburden and toe cut by the stream are the triggering factors for the slide.
37	Remedial measures	Removal of the debris from the slide area and easing of the slope by benching are recommended.
38	Remarks, if any	This landslide is retrogressive in nature. At places it is

		stabilized. Over the slide material vegetation growth are seen.
39	Summary/Abstract	Slides occurred on the lowly dissected slope and having a width of 50m. This landslide is retrogressive in nature. At places it is stabilized. Over the slide material vegetation growth are seen. Removal of the debris from the slide area and easing of the slope by benching are recommended.
40	Date of Reporting	04-01-2020
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	84
1	Slide No.	KAR/SG/48O1/2019/84
2	Latitude (N)	13.7847
3	Longitude (E)	75.0405
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Hirinagadde-1
8	NH/SH/Locality Locality-Hirinagadde	
9	Length (m)	12
10	Width (m)	30
11	Height (m)	10
12	Area (m)	360
13	Depth (m)	1
14	Volume (m)	360
15	Run out distance (m)	Nil
16	Type of Material	Debris
17	Type of movement	Slide
18	Rate of movement	Slow
19	Activity	Reactivated
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Lowly dissected slope
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	Sparse vegetation
28	Hydrological condition	dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Agriculture
36	Geo-scientific Causes	Very soft slope forming material which is on vertical slope and the material lost its strength by continuous rainfall.
37	Remedial measures	Easing of the slope is recommended.
38	Remarks, if any	The slide initiated in 2006 and since then every year during the monsoon it gets reactivated.
39	Summary/Abstract	The slide initiated on low lying vertical slope. Very soft

		slope forming material which is on vertical slope and the material lost its strength by continuous rainfall. The slide initiated in 2006 and since then every year during the monsoon its gets reactivated.
40	Date of Reporting	04-01-2020
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K
		



S. No.	Slide No.	85
1	Slide No.	KAR/SG/48O1/2019/85
2	Latitude (N)	13.8063
3	Longitude (E)	75.0314
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Bolakoppa
8	NH/SH/LocalityLocality-Bolakoppa	
9	Length (m)	12
10	Width (m)	45
11	Height (m)	8
12	Area (m)	540
13	Depth (m)	1
14	Volume (m)	540
15	Run out distance (m)	Nil
16	Type of Material	Debris
17	Type of movement	Slide
18	Rate of movement	Rapid
19	Activity	Active
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Rolling plain
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	Sparse vegetation
28	Hydrological condition	dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Settlement
36	Geo-scientific Causes	The slope is modified for settlement and the thick overburden slope left as vertical cut without any remedial measures.
37	Remedial measures	Construction of retaining wall with proper weep holes and toe drain is recommended.
38	Remarks, if any	Slide occurred adjacent to the settlement.

39	Summary/Abstract	The slope modified for settlement and slope left as vertical cut without any remedial measures. Construction of retaining wall with proper weep holes, easing of the slope and toe drain is recommended.
40	Date of Reporting	04-01-2020
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	86
1	Slide No.	KAR/SG/48O1/2019/86
2	Latitude (N)	13.8158
3	Longitude (E)	75.0582
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Ravemane
8	NH/SH/Locality Locality-Ravemane	
9	Length (m)	35
10	Width (m)	12
11	Height (m)	28
12	Area (m)	420
13	Depth (m)	5
14	Volume (m)	2100
15	Run out distance (m)	Nil
16	Type of Material	Debris
17	Type of movement	Slide
18	Rate of movement	Rapid
19	Activity	Active
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Deep translational Failure
23	History	Aug 2019
24	Geomorphology	Moderately dissected slope
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	Thick vegetation
28	Hydrological condition	Dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Forest
36	Geo-scientific Causes	Continuous rainfall may have increased the pore water pressure in the thick overburden and steep slope are the causes for the slide.
37	Remedial measures	Clearing of the debris, fallentrees and easing of the slope is recommended.
38	Remarks, if any	Nil
39	Summary/Abstract	The slide originated on the lowly dissected, thickly

		vegetated area. Clearing of the debris, fallen trees and easing of the slope is recommended.
40	Date of Reporting	05-01-2020
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	87
1	Slide No.	KAR/SG/48O1/2019/87
2	Latitude (N)	13.83
3	Longitude (E)	75.1938
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Mudali
8	NH/SH/Locality Locality-Mudali	
9	Length (m)	10
10	Width (m)	65
11	Height (m)	6
12	Area (m)	650
13	Depth (m)	3.5
14	Volume (m)	2275
15	Run out distance (m)	Nil
16	Type of Material	Debris
17	Type of movement	Slide
18	Rate of movement	Rapid
19	Activity	Reactivated
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Rolling plain
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	Thick vegetation
28	Hydrological condition	dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Forest
36	Geo-scientific Causes	Continuous rainfall may have increased the pore water pressure in the thick overburden which is exposed on the vertical slope.
37	Remedial measures	Clearing of the debris and construction of channel wall.
38	Remarks, if any	Nil
39	Summary/Abstract	Clearing of the debris, construction of channel wall

		recommended.
40	Date of Reporting	07-01-2020
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	88
1	Slide No.	KAR/SG/48O1/2019/88
2	Latitude (N)	13.8767
3	Longitude (E)	75.1851
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Kadasuru
8	NH/SH/Locality Locality-Kadasuru	
9	Length (m)	20
10	Width (m)	300
11	Height (m)	8
12	Area (m)	6000
13	Depth (m)	4
14	Volume (m)	24000
15	Run out distance (m)	Nil
16	Type of Material	Debris
17	Type of movement	Slide
18	Rate of movement	Rapid
19	Activity	Reactivated
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Lowly dissected slope
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	High height plantation
28	Hydrological condition	dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	High height plantation
36	Geo-scientific Causes	Continuous rainfall may have increased the pore water pressure in the thick overburden which is exposed on the vertical slope.
37	Remedial measures	Clearing of the debris and easing of the slope, applying Geo-jute or any natural plantation, maintaining of the drainage are recommended.

38	Remarks, if any	From the crown 250m away settlement situated.
39	Summary/Abstract	The slide initiated since 2006 and reactivated 2019.
40	Date of Reporting	07-01-2020
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	89
1	Slide No.	KAR/SG/48O1/2019/89
2	Latitude (N)	13.8906
3	Longitude (E)	75.1859
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Sunkal-2
8	NH/SH/LocalityLocality-Sunkal	
9	Length (m)	7
10	Width (m)	100
11	Height (m)	5
12	Area (m)	700
13	Depth (m)	2.5
14	Volume (m)	1750
15	Run out distance (m)	Nil
16	Type of Material	Debris
17	Type of movement	Slide
18	Rate of movement	Rapid
19	Activity	Reactivated
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Lowly dissected slope
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	Extensive slope cut
28	Hydrological condition	Damp
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Forest
36	Geo-scientific Causes	Continuous rainfall increased the pore water pressure and increased the water level in the channel which lead to loss of strength by soil and toe cut/ scouring by the stream.
37	Remedial measures	Construction of Channel wall is recommended.
38	Remarks, if any	Nil
39	Summary/Abstract	The slide seen along the plantation and cultivated land.

		The slide initiated since 2010 and reactivated 2019. Construction of Channel wall is recommended.
40	Date of Reporting	09-01-2020
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	90
1	Slide No.	KAR/SG/48O1/2019/90
2	Latitude (N)	13.8931
3	Longitude (E)	75.1903
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Sunkal
8	NH/SH/Locality Locality-Sunkal	
9	Length (m)	10
10	Width (m)	25
11	Height (m)	7
12	Area (m)	250
13	Depth (m)	2
14	Volume (m)	500
15	Run out distance (m)	Nil
16	Type of Material	Debris
17	Type of movement	Slide
18	Rate of movement	Rapid
19	Activity	Reactivated
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	July-2019, Aug-2019
24	Geomorphology	Rolling plain
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	High height plantation
28	Hydrological condition	Dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Forest
36	Geo-scientific Causes	Continuous rainfall may have increased the pore water pressure in the thick overburden which is exposed on the vertical slope.
37	Remedial measures	Clearing of the debris and construction of channel wall.
38	Remarks, if any	Nil
39	Summary/Abstract	The slide initiated july 2019 rainfall and reactivated on

		Aug 2019. Continuous rainfall may have increased the pore water pressure in the thick overburden which is exposed on the vertical slope. Construction of Channel wall is recommended.
40	Date of Reporting	09-01-2020
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	91
1	Slide No.	KAR/SG/48O1/2019/91
2	Latitude (N)	13.8929
3	Longitude (E)	75.1912
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Sunkal-1
8	NH/SH/Locality	Locality-Sunkal
9	Length (m)	10
10	Width (m)	40
11	Height (m)	7
12	Area (m)	400
13	Depth (m)	2.5
14	Volume (m)	1000
15	Run out distance (m)	Nil
16	Type of Material	Debris
17	Type of movement	Slide
18	Rate of movement	Rapid
19	Activity	Reactivated
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Rolling plain
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	Sparse vegetation
28	Hydrological condition	Dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Forest
36	Geo-scientific Causes	Continuous rainfall may have increased the pore water pressure in the thick overburden which is exposed on the vertical slope. Increase of the water level in the channel which lead to toe cut/scouring by the stream.
37	Remedial measures	Easing of the slope, clearing of the debris and construction of channel wall are recommended.
38	Remarks, if any	Nil

39	Summary/Abstract	Continuous rainfall may have increased the pore water pressure in the thick overburden which is exposed on the vertical slope. Increase of the water level in the channel which leads to toe cut/scouring by the stream. Easing of the slope, clearing of the debris and construction of channel wall are recommended.
40	Date of Reporting	09-01-2020
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



1851

S. No.	Slide No.	92
1	Slide No.	KAR/SG/48O1/2019/92
2	Latitude (N)	13.8898
3	Longitude (E)	75.1728
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Malur
8	NH/SH/Locality	Locality-Malur
9	Length (m)	18
10	Width (m)	150
11	Height (m)	15
12	Area (m)	2700
13	Depth (m)	2.5
14	Volume (m)	6750
15	Run out distance (m)	Nil
16	Type of Material	Debris
17	Type of movement	Slide
18	Rate of movement	Rapid
19	Activity	Reactivated
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	19-Aug
24	Geomorphology	Rolling plain
25	Geology/Lithology	Amphibolite
26	Structure	Nil
27	Landuse/ Landcover	Sparse vegetation
28	Hydrological condition	Dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Agriculture
36	Geo-scientific Causes	Continuous rainfall may have increased the pore water pressure in the thick overburden which is exposed on the vertical slope. Increase of the water level in the channel which lead to toe cut/scouring by the stream
37	Remedial measures	Easing of the slope and construction of channel wall. During monsoon season red alert to be given in this area and monitoring to be done continuously.

38	Remarks, if any	Initiation of the slide was in 2006. Since then the slide has reactivated every year and above the crown many houses are situated. Many crown cracks are observed and they are extending for very long distance having a width of 10-20 cm and depth of about 1m. Next monsoon this area will definitely fail. The upslope is dipping towards the slide direction.
39	Summary/Abstract	Continuous rainfall may have increased the pore water pressure in the thick overburden which is exposed on the vertical slope. Increase of the water level in the channel which leads to toe cut/ scouring by the stream. Initiation of the slide was in 2006. Since then the slide has reactivated every year and above the crown many houses are situated. Many crown cracks are observed and they are extending for very long distance having a width of 10-20 cm and depth of about 1m. Next monsoon this area will definitely fail. The upslope is dipping towards the slide direction.
40	Date of Reporting	09-01-2020
41	Landslide Category	Category-I
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	93
1	Slide No.	KAR/SG/48O1/2019/93
2	Latitude (N)	13.8909
3	Longitude (E)	75.1713
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Malur-1
8	NH/SH/Locality Locality-Malur	
9	Length (m)	20
10	Width (m)	50
11	Height (m)	18
12	Area (m)	1000
13	Depth (m)	2
14	Volume (m)	2000
15	Run out distance (m)	Nil
16	Type of Material	Soil
17	Type of movement	Slide
18	Rate of movement	Rapid
19	Activity	Reactivated
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Rolling plain
25	Geology/Lithology	Amphibolite
26	Structure	Nil
27	Landuse/ Landcover	Sparse vegetation
28	Hydrological condition	Dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Foot path washed away
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Agriculture
36	Geo-scientific Causes	Continuous rainfall may have increased the pore water pressure in the thick overburden which is exposed on the vertical slope. Increase of the water level in the channel which leads to toe cut/scouring by the stream.
37	Remedial measures	Easing of the slope and lining of the stream.
38	Remarks, if any	Cracks observed on the crown portion. The flowing

		stream shifted towards hill side as per local communication.
39	Summary/Abstract	Continuous rainfall may have increased the pore water pressure in the thick overburden which is exposed on the vertical slope. Increase of the water level in the channel which leads to toe cut/scouring by the stream.
40	Date of Reporting	11-01-2020
41	Landslide Category	Category-I
42	Citation	Resya Reghu and Senthilkumar.K



1851

S. No.	Slide No.	94
1	Slide No.	KAR/SG/48O1/2019/94
2	Latitude (N)	13.9148
3	Longitude (E)	75.1876
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Kannuru
8	NH/SH/Locality	Locality-Kannuru
9	Length (m)	7
10	Width (m)	25
11	Height (m)	6
12	Area (m)	175
13	Depth (m)	2
14	Volume (m)	350
15	Run out distance (m)	Nil
16	Type of Material	Soil
17	Type of movement	Slide
18	Rate of movement	Rapid
19	Activity	Reactivated
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Rolling plain
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	Sparse vegetation
28	Hydrological condition	Damp
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Agriculture
36	Geo-scientific Causes	Continuous rainfall may have increased the pore water pressure in the thick overburden which is exposed on the vertical slope. Increase of the water level in the channel which leads to toe cut/scouring by the stream.
37	Remedial measures	Removal of the debris to regularize stream flow and construction of channel wall.
38	Remarks, if any	Nil

39	Summary/Abstract	The slide initiated in 2010 since then every year it gets reactivated. Continuous rainfall and toe cut by stream are the main causes for the slide. Removal of the debris to regularize stream flow and construction of channel wall is recommended.
40	Date of Reporting	11-01-2020
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



1851

S. No.	Slide No.	95
1	Slide No.	KAR/SG/48O1/2019/95
2	Latitude (N)	13.9231
3	Longitude (E)	75.1862
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Herekoppa
8	NH/SH/Locality Locality- Herekoppa	
9	Length (m)	6
10	Width (m)	13
11	Height (m)	4
12	Area (m)	78
13	Depth (m)	2
14	Volume (m)	156
15	Run out distance (m)	Nil
16	Type of Material	Soil
17	Type of movement	Slide
18	Rate of movement	Slow
19	Activity	Active
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Rolling plain
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	Extensive slope cut
28	Hydrological condition	Dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Forest
36	Geo-scientific Causes	Continuous rainfall may have increased the pore water pressure in the thick overburden which is exposed on the vertical slope. Increase in the water level in the channel which leads to toe cut/scouring by the stream.
37	Remedial measures	Removal of the debris to regularize stream flow and construction of channel wall.

38	Remarks, if any	Nil
39	Summary/Abstract	Removal of the debris to regularize stream flow and construction of channel wall.
40	Date of Reporting	11-01-2020
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	96
1	Slide No.	KAR/SG/48O1/2019/96
2	Latitude (N)	13.9188
3	Longitude (E)	75.1838
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Kannuru-1
8	NH/SH/Locality Locality- Kannuru	
9	Length (m)	10
10	Width (m)	55
11	Height (m)	7
12	Area (m)	550
13	Depth (m)	4
14	Volume (m)	2200
15	Run out distance (m)	Nil
16	Type of Material	Soil
17	Type of movement	Slide
18	Rate of movement	Slow
19	Activity	Reactivated
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Rolling plain
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	Thick vegetation
28	Hydrological condition	Dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Forest
36	Geo-scientific Causes	Incessant rainfall, thick overburden in the steep slope and toe cut by drainage are the main causes.
37	Remedial measures	Removal of the debris to regularize stream flow and construction of channel wall. Easing of the slope.
38	Remarks, if any	Nil
39	Summary/Abstract	Slide initiated since 2010. Stream cut the slope and it is

		shifting towards the hill side.
40	Date of Reporting	11-01-2020
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	97
1	Slide No.	KAR/SG/48O1/2019/97
2	Latitude (N)	13.8777
3	Longitude (E)	75.2157
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Hondalagadde
8	NH/SH/Locality Locality-Hondalagadde	
9	Length (m)	8
10	Width (m)	5
11	Height (m)	6
12	Area (m)	40
13	Depth (m)	3
14	Volume (m)	120
15	Run out distance (m)	Nil
16	Type of Material	Soil
17	Type of movement	Slide
18	Rate of movement	Slow
19	Activity	Active
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Lowly dissected slope
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	Thick vegetation
28	Hydrological condition	Dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Agriculture
36	Geo-scientific Causes	Slope modified for the cultivation purpose, incessant rainfall.
37	Remedial measures	Removal of the debris and maintaining of the drainage, construction of breast wall recommended.
38	Remarks, if any	Road passing just above the landslide.
39	Summary/Abstract	Slope modified for the cultivation purpose, incessant

		rainfall. Removal of the debris and maintaining of the drainage, construction of breast wall recommended.
40	Date of Reporting	11-01-2020
41	Landslide Category	Category-II
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	98
1	Slide No.	KAR/SG/48O1/2019/98
2	Latitude (N)	13.8817
3	Longitude (E)	75.2166
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Hondalagadde-1
8	NH/SH/LocalityLocality-Hondalagadde	
9	Length (m)	6
10	Width (m)	32
11	Height (m)	5
12	Area (m)	192
13	Depth (m)	0.5
14	Volume (m)	96
15	Run out distance (m)	Nil
16	Type of Material	Debris
17	Type of movement	Slide
18	Rate of movement	Slow
19	Activity	Reactivated
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Lowly dissected slope
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	Thick vegetation
28	Hydrological condition	Dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Agriculture
36	Geo-scientific Causes	Continuous rainfall may have increased the pore water pressure
37	Remedial measures	Construction of channel wall and removal of the debris, maintainance of the drainage.
38	Remarks, if any	15 settlements situated above the crown.
39	Summary/Abstract	Rainfall is the main triggering factor. Slide dimension is

		very small.
40	Date of Reporting	13-01-2020
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	99
1	Slide No.	KAR/SG/48O1/2019/99
2	Latitude (N)	13.8863
3	Longitude (E)	75.1991
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Nagarahalli
8	NH/SH/LocalityLocality-Nagarahalli	
9	Length (m)	6
10	Width (m)	20
11	Height (m)	5
12	Area (m)	120
13	Depth (m)	0.5
14	Volume (m)	60
15	Run out distance (m)	Nil
16	Type of Material	Soil
17	Type of movement	Slide
18	Rate of movement	Slow
19	Activity	Active
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Lowly dissected slope
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	Thick vegetation
28	Hydrological condition	Dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Agriculture
36	Geo-scientific Causes	Gentle slope modified and the slope left vertically, natural stream flow modified, incessant rainfall is the causes for the slide.
37	Remedial measures	Benching and maintainance of the drainage are recommended.
38	Remarks, if any	Nil

39	Summary/Abstract	slide initiated by anthropogenic activity and aggravated by rainfall
40	Date of Reporting	13-01-2020
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	100
1	Slide No.	KAR/SG/48O1/2019/100
2	Latitude (N)	13.9688
3	Longitude (E)	75.1478
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Chitrahalli
8	NH/SH/Locality	Locality-Chitrahalli
9	Length (m)	7
10	Width (m)	50
11	Height (m)	5
12	Area (m)	350
13	Depth (m)	2
14	Volume (m)	700
15	Run out distance (m)	Nil
16	Type of Material	Soil
17	Type of movement	Slide
18	Rate of movement	Slow
19	Activity	Active
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Rolling plain
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	Thick vegetation
28	Hydrological condition	Dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Agriculture
36	Geo-scientific Causes	Continuous rainfall may have increased the pore water pressure.
37	Remedial measures	Maintainance of the drainage.
38	Remarks, if any	Nil
39	Summary/Abstract	Continuous rainfall may have increased the pore water

		pressure. Maintenance of the drainage.
40	Date of Reporting	14-01-2020
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	101
1	Slide No.	KAR/SG/48O1/2019/101
2	Latitude (N)	13.9627
3	Longitude (E)	75.15
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Belekoppa
8	NH/SH/Locality Locality-Belekoppa	
9	Length (m)	8
10	Width (m)	13
11	Height (m)	5
12	Area (m)	104
13	Depth (m)	1.5
14	Volume (m)	156
15	Run out distance (m)	Nil
16	Type of Material	Soil
17	Type of movement	Slide
18	Rate of movement	Slow
19	Activity	Active
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Moderately dissected slope
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	Sparse vegetation
28	Hydrological condition	Dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Agriculture
36	Geo-scientific Causes	Presence of saprolite layer and incessant rainfall.
37	Remedial measures	Maintainance of the drainage.
38	Remarks, if any	Nil
39	Summary/Abstract	Small dimension landslide initiated due to incessant rainfall and presence of weak slope forming material (saprolite).

40	Date of Reporting	14-01-2020
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	102
1	Slide No.	KAR/SG/48O1/2019/102
2	Latitude (N)	13.9736
3	Longitude (E)	75.1473
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Chitrahalli-1
8	NH/SH/Locality	Locality-Chitrahalli
9	Length (m)	10
10	Width (m)	50
11	Height (m)	8
12	Area (m)	500
13	Depth (m)	2.5
14	Volume (m)	1250
15	Run out distance (m)	Nil
16	Type of Material	Soil
17	Type of movement	Slide
18	Rate of movement	Slow
19	Activity	Reactivated
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Lowly dissected slope
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	Moderate vegetation
28	Hydrological condition	Dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Agriculture
36	Geo-scientific Causes	Continuous rainfall may have increased the pore water pressure in the thick overburden which is exposed on the vertical slope. Increase of the water level in the channel which leads to toe cut/scouring by the stream.
37	Remedial measures	Removal of the debris and maintaining the drainage is recommended.
38	Remarks, if any	Nil

39	Summary/Abstract	Continuous rainfall may have increase the pore water pressure in the thick overburden which is exposed on the vertical slope. Increase of the water level in the channel which leads to toe cut/scouring by the stream. Removal of the debris and maintaining the drainage is recommended.
40	Date of Reporting	14-01-20
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	103
1	Slide No.	KAR/SG/48O1/2019/103
2	Latitude (N)	13.98
3	Longitude (E)	75.1423
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Chitrahalli-2
8	NH/SH/Locality Locality-Chitrahalli	
9	Length (m)	8
10	Width (m)	12
11	Height (m)	6
12	Area (m)	96
13	Depth (m)	0.5
14	Volume (m)	48
15	Run out distance (m)	Nil
16	Type of Material	Debris
17	Type of movement	Slide
18	Rate of movement	Slow
19	Activity	Reactivated
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	19-Aug
24	Geomorphology	Rolling plain
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	Thick vegetation
28	Hydrological condition	Dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Agriculture
36	Geo-scientific Causes	Natural slope modified without any engineering consideration and incessant rainfall, toe cut by stream.
37	Remedial measures	Maintainanceof the drainage is recommended.
38	Remarks, if any	Nil
39	Summary/Abstract	The slide initiated on the gentle sloping area, Natural slope modified without any engineering consideration and

		incessant rainfall, toe cut by stream are the major causes. Maintainanceof the drainage is recommended.
40	Date of Reporting	22-01-20
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	104
1	Slide No.	KAR/SG/48O1/2019/104
2	Latitude (N)	13.8414
3	Longitude (E)	75.0629
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Arodi
8	NH/SH/Locality	SH-52
9	Length (m)	7
10	Width (m)	10
11	Height (m)	5
12	Area (m)	70
13	Depth (m)	1.5
14	Volume (m)	105
15	Run out distance (m)	Nil
16	Type of Material	Soil
17	Type of movement	Slide
18	Rate of movement	Slow
19	Activity	Active
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Moderately dissected slope
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	Thick vegetation
28	Hydrological condition	Dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Forest
36	Geo-scientific Causes	Slope angle modified for the road construction.
37	Remedial measures	Easing of the slope
38	Remarks, if any	Nil
39	Summary/Abstract	Slope modified for road construction.
40	Date of Reporting	22-01-20

41	Landslide Category	Category-II
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	105
1	Slide No.	KAR/SG/48O1/2019/105
2	Latitude (N)	13.8405
3	Longitude (E)	75.0629
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Arodi-1
8	NH/SH/Locality	SH-52
9	Length (m)	8
10	Width (m)	12
11	Height (m)	7
12	Area (m)	96
13	Depth (m)	1
14	Volume (m)	96
15	Run out distance (m)	Nil
16	Type of Material	Debris
17	Type of movement	Slide
18	Rate of movement	Slow
19	Activity	Active
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Moderately dissected slope
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	Sparse vegetation
28	Hydrological condition	Dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Forest
36	Geo-scientific Causes	Slope angle modified for the road construction.
37	Remedial measures	Easing of the slope.
38	Remarks, if any	Nil
39	Summary/Abstract	Slope modified for road construction.
40	Date of Reporting	22-01-20

41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	106
1	Slide No.	KAR/SG/48O1/2019/106
2	Latitude (N)	13.9271
3	Longitude (E)	75.2055
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Karugodu
8	NH/SH/Locality	Locality-Karugodu
9	Length (m)	18
10	Width (m)	100
11	Height (m)	15
12	Area (m)	1800
13	Depth (m)	1
14	Volume (m)	1800
15	Run out distance (m)	Nil
16	Type of Material	Soil
17	Type of movement	Slide
18	Rate of movement	Slow
19	Activity	Reactivated
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Lowly dissected slope
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	Sparse vegetation
28	Hydrological condition	Dry
29	Triggering Factor	Rainfall/Anthropogenic
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Forest
36	Geo-scientific Causes	Vertical slope with thick overburden, incessant rainfall and toe cut by stream.
37	Remedial measures	Removal of the debris, easing of the slope and construction of channel wall.
38	Remarks, if any	Nil
39	Summary/Abstract	Vertical slope with thick overburden, incessant rainfall fall and toe cut by stream. Easing of the slope and

		construction of channel wall.
40	Date of Reporting	25-01-20
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	107
1	Slide No.	KAR/SG/48O1/2019/107
2	Latitude (N)	13.9215
3	Longitude (E)	75.1831
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	K.Kannuru
8	NH/SH/Locality	Locality-Kannuru
9	Length (m)	18
10	Width (m)	150
11	Height (m)	10
12	Area (m)	2700
13	Depth (m)	2.5
14	Volume (m)	6750
15	Run out distance (m)	Nil
16	Type of Material	Soil
17	Type of movement	Slide
18	Rate of movement	Slow
19	Activity	Reactivated
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Rolling plain
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	Sparse vegetation
28	Hydrological condition	Dry
29	Triggering Factor	Rainfall/Anthropogenic
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Forest
36	Geo-scientific Causes	Incessant rainfall may have increased the pore water pressure in the thick overburden which is on vertical slope. The weak slope forming material eroded by stream during the heavy rainfall.
37	Remedial measures	Removal of the debris, trees and maintainance of the drainage are recommended.
38	Remarks, if any	Nil

39	Summary/Abstract	Incessant rainfall may have increased the pore water pressure in the thick overburden which is on vertical slope. The weak slope forming material eroded by stream during the heavy rainfall.
40	Date of Reporting	25-01-20
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	108
1	Slide No.	KAR/SG/48O1/2019/108
2	Latitude (N)	13.9175
3	Longitude (E)	75.1843
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Kannuru-2
8	NH/SH/Locality	Locality-Kannuru
9	Length (m)	18
10	Width (m)	150
11	Height (m)	12
12	Area (m)	2700
13	Depth (m)	3
14	Volume (m)	8100
15	Run out distance (m)	Nil
16	Type of Material	Soil
17	Type of movement	Slide
18	Rate of movement	Slow
19	Activity	Reactivated
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Rolling plain
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	Thick vegetation
28	Hydrological condition	Dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Forest
36	Geo-scientific Causes	Incessant rainfall increased the pore water pressure in the thick overburden which is on vertical slope. The weak slope forming material eroded by stream during the heavy rainfall.
37	Remedial measures	Removal of the debris, fallen trees and maintenance of the drainage are recommended.

38	Remarks, if any	Nil
39	Summary/Abstract	Incessant rainfall increased the pore water pressure in the thick overburden which is on vertical slope. The weak slope forming material eroded by stream during the heavy rainfall.
40	Date of Reporting	25-01-20
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



1851

S. No.	Slide No.	109
1	Slide No.	KAR/SG/48O1/2019/109
2	Latitude (N)	13.9276
3	Longitude (E)	75.1826
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Harekoppa
8	NH/SH/Locality	Locality-Harekoppa
9	Length (m)	7
10	Width (m)	20
11	Height (m)	6
12	Area (m)	140
13	Depth (m)	2
14	Volume (m)	280
15	Run out distance (m)	Nil
16	Type of Material	Debris
17	Type of movement	Slide
18	Rate of movement	Slow
19	Activity	Reactivated
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Rolling plain
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	Sparse vegetation
28	Hydrological condition	Dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Forest
36	Geo-scientific Causes	Toe cut and incessant rainfall are the main causes.
37	Remedial measures	Maintenance of the drainage is recommended.
38	Remarks, if any	Nil
39	Summary/Abstract	Very small dimension slide triggered by rainfall and toe cut by stream.

40	Date of Reporting	25-01-20
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	110
1	Slide No.	KAR/SG/48O1/2019/110
2	Latitude (N)	13.9257
3	Longitude (E)	75.1774
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Kalkankoppa
8	NH/SH/Locality Locality-Kalkankoppa	
9	Length (m)	15
10	Width (m)	500
11	Height (m)	12
12	Area (m)	7500
13	Depth (m)	2.5
14	Volume (m)	18750
15	Run out distance (m)	Nil
16	Type of Material	Debris
17	Type of movement	Slide
18	Rate of movement	Slow
19	Activity	Reactivated
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Rolling plain
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	Extensive slope cut
28	Hydrological condition	Dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Forest
36	Geo-scientific Causes	Toe cut by stream, incessant rainfall and thick overburden in the vertical slope are the main causes.
37	Remedial measures	Easing of the slope and maintaining of the drainage are recommended.
38	Remarks, if any	Nil
39	Summary/Abstract	Toe cut by stream incessant rainfall and thick overburden

		in the vertical slope are the main causes. Easing of the slope and maintaining of the drainage are recommended.
40	Date of Reporting	25-01-20
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	111
1	Slide No.	KAR/SG/48O1/2019/111
2	Latitude (N)	13.9283
3	Longitude (E)	75.1783
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Kalkankoppa-1
8	NH/SH/Locality	Locality-Kalkankoppa
9	Length (m)	12
10	Width (m)	400
11	Height (m)	10
12	Area (m)	4800
13	Depth (m)	3
14	Volume (m)	14400
15	Run out distance (m)	Nil
16	Type of Material	Debris
17	Type of movement	Slide
18	Rate of movement	Slow
19	Activity	Reactivated
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Rolling plain
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	Extensive slope cut
28	Hydrological condition	Dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Forest
36	Geo-scientific Causes	Toe cut by stream, incessant rainfall and thick overburden in the vertical slope are the main causes.
37	Remedial measures	Easing of the slope and maintaining of the drainage are recommended.
38	Remarks, if any	Nil
39	Summary/Abstract	Toe cut by stream, incessant rainfall and thick overburden in the vertical slope are the main causes. Easing of the

		slope and maintaining of the drainage are recommended.
40	Date of Reporting	27-01-20
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	112
1	Slide No.	KAR/SG/48O1/2019/112
2	Latitude (N)	13.924
3	Longitude (E)	75.1616
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Bailshettikoppa
8	NH/SH/Locality Locality-Bailshettikoppa	
9	Length (m)	7
10	Width (m)	35
11	Height (m)	5
12	Area (m)	245
13	Depth (m)	2
14	Volume (m)	490
15	Run out distance (m)	Nil
16	Type of Material	Soil
17	Type of movement	Slide
18	Rate of movement	Slow
19	Activity	Reactivated
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Rolling plain
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	Thick vegetation
28	Hydrological condition	Dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Forest
36	Geo-scientific Causes	Incessant rainfall.
37	Remedial measures	Maintaining of the drainage is recommended.
38	Remarks, if any	Nil
39	Summary/Abstract	Nil
40	Date of Reporting	27-01-20

41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	113
1	Slide No.	KAR/SG/4801/2019/113
2	Latitude (N)	13.9075
3	Longitude (E)	75.1565
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	480/1
7	Name of the slide	Huligaru
8	NH/SH/Locality Locality-Huligaru	
9	Length (m)	6
10	Width (m)	25
11	Height (m)	5
12	Area (m)	150
13	Depth (m)	3
14	Volume (m)	450
15	Run out distance (m)	Nil
16	Type of Material	Soil
17	Type of movement	Slide
18	Rate of movement	Slow
19	Activity	Reactivated
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Rolling plain
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	High height plantation
28	Hydrological condition	Dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Forest
36	Geo-scientific Causes	Incessant rainfall and toe cut by nala.
37	Remedial measures	Maintaining of the drainage is recommended.
38	Remarks, if any	Nil
39	Summary/Abstract	Incessant rainfall and toe cut by nala. Maintaining of the drainage is recommended.

40	Date of Reporting	27-01-2020
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	114
1	Slide No.	KAR/SG/48O1/2019/114
2	Latitude (N)	13.9066
3	Longitude (E)	75.1571
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Huligaru-1
8	NH/SH/Locality	Locality-Huligaru
9	Length (m)	10
10	Width (m)	20
11	Height (m)	6
12	Area (m)	200
13	Depth (m)	2
14	Volume (m)	400
15	Run out distance (m)	Nil
16	Type of Material	Debris
17	Type of movement	Slide
18	Rate of movement	Slow
19	Activity	Reactivated
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Rolling plain
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	Thick vegetation
28	Hydrological condition	Dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Forest
36	Geo-scientific Causes	Incessant rainfall and toe cut by drainage.
37	Remedial measures	Removal of the debris, Maintaining of the drainage are recommended.
38	Remarks, if any	Nil
39	Summary/Abstract	Removal of the debris, Maintaining of the drainage are recommended.

40	Date of Reporting	27-01-20
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	115
1	Slide No.	KAR/SG/48O1/2019/115
2	Latitude (N)	13.9054
3	Longitude (E)	75.1579
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Huligaru-2
8	NH/SH/Locality Locality-Huligaru	
9	Length (m)	25
10	Width (m)	40
11	Height (m)	15
12	Area (m)	1000
13	Depth (m)	3
14	Volume (m)	3000
15	Run out distance (m)	Nil
16	Type of Material	Debris
17	Type of movement	Slide
18	Rate of movement	Slow
19	Activity	Reactivated
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Moderately dissected slope
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	Thick vegetation
28	Hydrological condition	Dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Forest
36	Geo-scientific Causes	Weak and thick slope forming material in the vertical slope, toe cut by the stream and loss of soil strength due to incessant rainfall
37	Remedial measures	Clearing of the debris and maintaining of the drainage will reduce failure.
38	Remarks, if any	Nil
39	Summary/Abstract	Weak and thick slope forming material in the vertical

		slope, toe cut by the stream and loss of soil strength due to incessant rainfall. Clearing of the debris and maintaining of the drainage will reduce failure.
40	Date of Reporting	27-01-20
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	116
1	Slide No.	KAR/SG/48O1/2019/116
2	Latitude (N)	13.9056
3	Longitude (E)	75.1593
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Huligaru-3
8	NH/SH/Locality	Road connecting Bailshettikoppa and Maitalli
9	Length (m)	8
10	Width (m)	35
11	Height (m)	7
12	Area (m)	280
13	Depth (m)	0.5
14	Volume (m)	140
15	Run out distance (m)	Nil
16	Type of Material	Debris
17	Type of movement	Slide
18	Rate of movement	Slow
19	Activity	Active
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Rolling plain
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	Extensive slope cut
28	Hydrological condition	Dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Agriculture
36	Geo-scientific Causes	Incessant rainfall and toe cut by nala.
37	Remedial measures	Maintaining of the drainage is recommended.
38	Remarks, if any	Nil
39	Summary/Abstract	Incessant rainfall and toe cut by nala. Maintaining of the drainage is recommended.

40	Date of Reporting	27-01-2020
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	117
1	Slide No.	KAR/SG/48O1/2019/117
2	Latitude (N)	13.9628
3	Longitude (E)	75.2552
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/5
7	Name of the slide	Karagodu
8	NH/SH/Locality Locality-Karagodu	
9	Length (m)	5
10	Width (m)	100
11	Height (m)	4
12	Area (m)	500
13	Depth (m)	0.5
14	Volume (m)	250
15	Run out distance (m)	Nil
16	Type of Material	Debris
17	Type of movement	Slide
18	Rate of movement	Slow
19	Activity	Reactivated
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Rolling plain
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	Moderate vegetation
28	Hydrological condition	Dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Agriculture
36	Geo-scientific Causes	Incessant rainfall and toe cut by drainage.
37	Remedial measures	Maintaining of the drainage is recommended.
38	Remarks, if any	Nil
39	Summary/Abstract	Small dimension slide occurred on the gentle sloping area due to Incessant rainfall and toe cut by nala.

40	Date of Reporting	04-02-2020
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	118
1	Slide No.	KAR/SG/48O1/2019/118
2	Latitude (N)	13.8771
3	Longitude (E)	75.137
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Alagaru
8	NH/SH/Locality	Locality-Alagaru
9	Length (m)	17
10	Width (m)	30
11	Height (m)	15
12	Area (m)	510
13	Depth (m)	3
14	Volume (m)	1530
15	Run out distance (m)	Nil
16	Type of Material	Debris
17	Type of movement	Slide
18	Rate of movement	Slow
19	Activity	Reactivated
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Lowly dissected slope
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	Thick vegetation
28	Hydrological condition	Dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Forest
36	Geo-scientific Causes	Thick over burden in the vertical slope and incessant rainfall caused the increase of pore water pressure. Toe cut by the stream.
37	Remedial measures	Removal of the debris and easing of the slope and lining of the stream are recommended.
38	Remarks, if any	Nil

39	Summary/Abstract	Landslide occurred on the lowly dissected hill slope. Easing of the slope by proper benching and construction of channel wall.
40	Date of Reporting	04-02-2020
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	119
1	Slide No.	KAR/SG/48O1/2019/119
2	Latitude (N)	13.8763
3	Longitude (E)	75.1351
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Alagaru-1
8	NH/SH/LocalityLocality-Alagaru	
9	Length (m)	25
10	Width (m)	40
11	Height (m)	18
12	Area (m)	1000
13	Depth (m)	3
14	Volume (m)	3000
15	Run out distance (m)	Nil
16	Type of Material	Debris
17	Type of movement	Slide
18	Rate of movement	Slow
19	Activity	Reactivated
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Lowly dissected slope
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	Thick vegetation
28	Hydrological condition	Dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Forest
36	Geo-scientific Causes	Thick over burden in the vertical slope and incessant rainfall caused the increase of pore water pressure. Toe cut by the stream.
37	Remedial measures	Removal of the debris and easing of the slope and lining of the stream are recommended.
38	Remarks, if any	Nil

39	Summary/Abstract	Landslide occurred on the lowly dissected hill slope. Easing of the slope by proper benching and construction of channel wall.
40	Date of Reporting	04-02-2020
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	120
1	Slide No.	KAR/SG/48O1/2019/120
2	Latitude (N)	13.8775
3	Longitude (E)	75.1385
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Alagaru-2
8	NH/SH/Locality	Locality-Alagaru
9	Length (m)	11
10	Width (m)	30
11	Height (m)	8
12	Area (m)	330
13	Depth (m)	0.5
14	Volume (m)	165
15	Run out distance (m)	Nil
16	Type of Material	Debris
17	Type of movement	Slide
18	Rate of movement	Rapid
19	Activity	suspended
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Lowly dissected slope
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	Thick vegetation
28	Hydrological condition	Dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Forest
36	Geo-scientific Causes	Highly jointed rock and incessant rain fall are the main cause for the slide
37	Remedial measures	Removal of the debris and maintaining of the drainage are recommended.
38	Remarks, if any	Nil
39	Summary/Abstract	Nil

40	Date of Reporting	04-02-2020
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	121
1	Slide No.	KAR/SG/48O1/2019/121
2	Latitude (N)	13.8818
3	Longitude (E)	75.1577
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Sattodi
8	NH/SH/Locality Locality-Sattodi	
9	Length (m)	8
10	Width (m)	40
11	Height (m)	8
12	Area (m)	320
13	Depth (m)	0.5
14	Volume (m)	160
15	Run out distance (m)	Nil
16	Type of Material	Soil
17	Type of movement	slide
18	Rate of movement	Slow
19	Activity	Active
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Lowly dissected slope
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	Extensive slope cut
28	Hydrological condition	Dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Agriculture
36	Geo-scientific Causes	Very weak slope forming material in the vertical steep slope, incessant rainfall and toe cut by the stream.
37	Remedial measures	Easing of the slope or construction of channel wall recommended.
38	Remarks, if any	Nil
39	Summary/Abstract	Slide originated on gentle topography on vertical slope. Easing of the slope or construction of channel wall

		recommended.
40	Date of Reporting	04-02-2020
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	122
1	Slide No.	KAR/SG/48O1/2019/122
2	Latitude (N)	13.8549
3	Longitude (E)	75.1663
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Anegadde
8	NH/SH/Locality	Locality-Anegadde
9	Length (m)	15
10	Width (m)	150
11	Height (m)	12
12	Area (m)	2250
13	Depth (m)	1
14	Volume (m)	2250
15	Run out distance (m)	Nil
16	Type of Material	Soil
17	Type of movement	slide
18	Rate of movement	Slow
19	Activity	Reactivated
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	9th Aug 2019
24	Geomorphology	Rolling plain
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	Extensive slope cut
28	Hydrological condition	Dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Forest
36	Geo-scientific Causes	In the vertical steep slope weak and thick overburden disposed, incessant rainfall increased the pore water pressure and stream eroded the toe.
37	Remedial measures	Removal of the debris, easing of the slope may reduce the further failure.
38	Remarks, if any	Caving noticed in the thick overburden.

39	Summary/Abstract	In the vertical steep slope weak and thick overburden disposed, incessant rainfall increased the pore water pressure and stream eroded the toe. Removal of the debris, easing of the slope may reduce the further failure.
40	Date of Reporting	04-02-2020
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	123
1	Slide No.	KAR/SG/48O1/2019/123
2	Latitude (N)	13.9455
3	Longitude (E)	75.0988
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Mutturu-1
8	NH/SH/Locality	Locality-Mutturu
9	Length (m)	12
10	Width (m)	30
11	Height (m)	8
12	Area (m)	360
13	Depth (m)	1
14	Volume (m)	360
15	Run out distance (m)	Nil
16	Type of Material	Debris
17	Type of movement	slide
18	Rate of movement	Slow
19	Activity	Reactivated
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Lowly dissected slope
25	Geology/Lithology	Amphibolite
26	Structure	Nil
27	Landuse/ Landcover	Thick vegetation
28	Hydrological condition	Damp
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Forest
36	Geo-scientific Causes	Thick and weak slope forming material in the vertical slope and incessant rainfall and toe cut by the stream.
37	Remedial measures	Easing of the slope and construction of channel wall are recommended.
38	Remarks, if any	Nil
39	Summary/Abstract	Formation of thick laterite horizon and in between occurrence of saprolite layer. The saprolite layer is the

		main reason for the slide. Slide initiated since 2006 and reactivated 2019.
40	Date of Reporting	10-02-2020
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	124
1	Slide No.	KAR/SG/48O1/2019/124
2	Latitude (N)	13.9931
3	Longitude (E)	75.1072
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Kachigebail
8	NH/SH/Locality	Locality-Kachigebail
9	Length (m)	8
10	Width (m)	40
11	Height (m)	8
12	Area (m)	320
13	Depth (m)	2
14	Volume (m)	640
15	Run out distance (m)	Nil
16	Type of Material	Debris
17	Type of movement	slide
18	Rate of movement	Slow
19	Activity	Reactivated
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Rolling plain
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	Thick vegetation
28	Hydrological condition	Damp
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Forest
36	Geo-scientific Causes	During the incessant rainfall the water level increased in the channel and the excess water cut the bank of the slope. Thick overburden in the vertical slope.
37	Remedial measures	Lining of the channel and easing of the slope are recommended.
38	Remarks, if any	Nil

39	Summary/Abstract	Slide initiated by anthropogenic activity and aggravated by incessant rainfall.
40	Date of Reporting	10-02-2020
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	125
1	Slide No.	KAR/SG/4801/2019/125
2	Latitude (N)	13.9753
3	Longitude (E)	75.0888
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	480/1
7	Name of the slide	Kankalale
8	NH/SH/Locality Locality-Kankalale	
9	Length (m)	10
10	Width (m)	10
11	Height (m)	8
12	Area (m)	100
13	Depth (m)	2
14	Volume (m)	200
15	Run out distance (m)	Nil
16	Type of Material	Debris
17	Type of movement	slide
18	Rate of movement	Slow
19	Activity	Stabilized
20	Distribution	Diminishing
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	2006
24	Geomorphology	Lowly dissected slope
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	Thick vegetation
28	Hydrological condition	Dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Agriculture
36	Geo-scientific Causes	The channel modified for agricultural purpose by modification of the slope.
37	Remedial measures	Avoid modification of the slope.
38	Remarks, if any	The slide stabilized and there is no any visible movement.
39	Summary/Abstract	The slide originated since 2006.

40	Date of Reporting	10-02-2020
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	126
1	Slide No.	KAR/SG/48O1/2019/126
2	Latitude (N)	13.9763
3	Longitude (E)	75.0644
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Manninakoppa
8	NH/SH/Locality	Locality-Manninakoppa
9	Length (m)	8
10	Width (m)	35
11	Height (m)	8
12	Area (m)	280
13	Depth (m)	0.5
14	Volume (m)	140
15	Run out distance (m)	Nil
16	Type of Material	Debris
17	Type of movement	slide
18	Rate of movement	Rapid
19	Activity	Reactivated
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	2018
24	Geomorphology	Rolling plain
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	Extensive slope cut
28	Hydrological condition	Dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Agriculture
36	Geo-scientific Causes	Incessant rain fall and toe cut by stream.
37	Remedial measures	Construction of channel wall and in the crown portion drainage to be maintained.
38	Remarks, if any	Settlement located 5m from the crown.
39	Summary/Abstract	Adjacent to the crown settlement located, during the monsoon season the slide to be monitored.

40	Date of Reporting	10-02-2020
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	127
1	Slide No.	KAR/SG/48O1/2019/127
2	Latitude (N)	13.9861
3	Longitude (E)	75.0326
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Patagoppa
8	NH/SH/Locality Locality-Patagoppa	
9	Length (m)	15
10	Width (m)	70
11	Height (m)	12
12	Area (m)	1050
13	Depth (m)	3
14	Volume (m)	3150
15	Run out distance (m)	Nil
16	Type of Material	Debris
17	Type of movement	slide
18	Rate of movement	Rapid
19	Activity	Reactivated
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Lowly dissected slope
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	Thick vegetation
28	Hydrological condition	Dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Agriculture
36	Geo-scientific Causes	Thick and weak slope forming material in the vertical slope, incessant rainfall increased the pore water pressure in the overburden and toe cut by the stream.
37	Remedial measures	Easing of the slope by benching and planting planatations like vetiver grass is recommended.
38	Remarks, if any	Nil

39	Summary/Abstract	The slide initiated in 2009 and since then reactivated every year. Thick weak slope forming material in the vertical slope, incessant rainfall increased the pore water pressure in the overburden and toe cut by the stream. Easing of the slope by benching and plantations like vetiver grass are recommended.
40	Date of Reporting	11-02-2020
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



1851

S. No.	Slide No.	128
1	Slide No.	KAR/SG/48O1/2019/128
2	Latitude (N)	13.9835
3	Longitude (E)	75.0516
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Jamballi
8	NH/SH/Locality Locality-Jamballi	
9	Length (m)	10
10	Width (m)	80
11	Height (m)	8
12	Area (m)	800
13	Depth (m)	1
14	Volume (m)	800
15	Run out distance (m)	Nil
16	Type of Material	Debris
17	Type of movement	slide
18	Rate of movement	Rapid
19	Activity	Reactivated
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Lowly dissected slope
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	Thick vegetation
28	Hydrological condition	Dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Agriculture
36	Geo-scientific Causes	Thick and weak slope forming material in the vertical slope, incessant rainfall increased the pore water pressure in the overburden and toe cut by the stream.
37	Remedial measures	Easing of the slope by benching and Channelizing of the stream are recommended.
38	Remarks, if any	Nil
39	Summary/Abstract	Thick and weak slope forming material in the vertical

		slope, incessant rainfall increased the pore water pressure in the overburden and toe cut by the stream. Easing of the slope by benching and Channelizing of the stream are recommended.
40	Date of Reporting	11-02-2020
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	129
1	Slide No.	KAR/SG/48O1/2019/129
2	Latitude (N)	13.9543
3	Longitude (E)	75.079
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Brahmeswara
8	NH/SH/Locality	Road connecting Brahmeswara and Kalikapur
9	Length (m)	8
10	Width (m)	15
11	Height (m)	6
12	Area (m)	120
13	Depth (m)	1
14	Volume (m)	120
15	Run out distance (m)	Nil
16	Type of Material	Debris
17	Type of movement	slide
18	Rate of movement	Rapid
19	Activity	Active
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Lowly dissected slope
25	Geology/Lithology	Quartz vein
26	Structure	Nil
27	Landuse/ Landcover	Moderate vegetation
28	Hydrological condition	Dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Forest
36	Geo-scientific Causes	The slope is modified for the construction of settlement and the toe left without any support. During the incessant rainfall the slope failed along the cut slope.
37	Remedial measures	The settlement should be relocated and easing of the slope is recommended.
38	Remarks, if any	Nil
39	Summary/Abstract	The slope is modified for the construction of settlement

		and the toe left without any support. During the incessant rainfall the slope failed along the cut slope. The settlement should be relocated and easing of the slope is recommended.
40	Date of Reporting	12-02-2020
41	Landslide Category	Category-I
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	130
1	Slide No.	KAR/SG/48O1/2019/130
2	Latitude (N)	13.9561
3	Longitude (E)	75.073
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Kalikapur
8	NH/SH/Locality	Locality-Kalikapur
9	Length (m)	9
10	Width (m)	12
11	Height (m)	5
12	Area (m)	108
13	Depth (m)	1
14	Volume (m)	108
15	Run out distance (m)	Nil
16	Type of Material	Debris
17	Type of movement	slide
18	Rate of movement	Rapid
19	Activity	Active
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Lowly dissected slope
25	Geology/Lithology	Amphibolite
26	Structure	Nil
27	Landuse/ Landcover	Sparse vegetation
28	Hydrological condition	Dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Forest
36	Geo-scientific Causes	Thick and weak slope forming material in the vertical slope and incessant rainfall steep slope, toe cut are the reason for the slide.
37	Remedial measures	Easing of the slope and removal of the debris.
38	Remarks, if any	One electrical pole damaged.
39	Summary/Abstract	The slide initiated in the steep slope which is having thick

		slope forming material. Easing of the slope and removal of the debris and maintaining of the drainage are recommended.
40	Date of Reporting	12-02-2020
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	131
1	Slide No.	KAR/SG/48O1/2019/131
2	Latitude (N)	13.8839
3	Longitude (E)	75.1071
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Handayalakoppa
8	NH/SH/Locality Locality-Handayalakoppa	
9	Length (m)	8
10	Width (m)	40
11	Height (m)	7
12	Area (m)	320
13	Depth (m)	1
14	Volume (m)	320
15	Run out distance (m)	Nil
16	Type of Material	Debris
17	Type of movement	slide
18	Rate of movement	Rapid
19	Activity	Reactivated
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Rolling plain
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	Sparse vegetation
28	Hydrological condition	Dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Forest
36	Geo-scientific Causes	Toe cut by the stream and incessant rainfall.
37	Remedial measures	Removal of the debris and regularizing of the stream channel are recommended.
38	Remarks, if any	Nil
39	Summary/Abstract	Toe cut by the stream and incessant rainfall. Removal of the debris and regularizing of the stream channel are

		recommended.
40	Date of Reporting	13-02-2020
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	132
1	Slide No.	KAR/SG/48O1/2019/132
2	Latitude (N)	13.8671
3	Longitude (E)	75.0522
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Sampemane
8	NH/SH/Locality Locality-Sampemane	
9	Length (m)	15
10	Width (m)	200
11	Height (m)	10
12	Area (m)	3000
13	Depth (m)	2
14	Volume (m)	6000
15	Run out distance (m)	Nil
16	Type of Material	Debris
17	Type of movement	slide
18	Rate of movement	Slow
19	Activity	Reactivated
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Lowly dissected slope
25	Geology/Lithology	Quartz-Chlorite Schist
26	Structure	Nil
27	Landuse/ Landcover	Sparse vegetation
28	Hydrological condition	Dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Forest
36	Geo-scientific Causes	Thick overburden, vertical slope, incessant rainfall, toe cut by the stream are the causes for the slide.
37	Remedial measures	Removal of the debris, easing of the slope and maintainance of the channel path.
38	Remarks, if any	Nil
39	Summary/Abstract	Thick overburden, vertical slope, incessant rainfall, toe cut by the stream are the causes for the slide. Removal of

		the debris, easing of the slope and maintainance of the channel path.
40	Date of Reporting	14-02-2020
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	133
1	Slide No.	KAR/SG/48O1/2019/133
2	Latitude (N)	13.8568
3	Longitude (E)	75.003
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Boppanamane
8	NH/SH/Locality	Road connecting Boppanamane and Brahmanataruve
9	Length (m)	8
10	Width (m)	8
11	Height (m)	6
12	Area (m)	64
13	Depth (m)	0.5
14	Volume (m)	32
15	Run out distance (m)	Nil
16	Type of Material	Debris
17	Type of movement	slide
18	Rate of movement	Rapid
19	Activity	Active
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Moderately dissected slope
25	Geology/Lithology	Garnet-Grunerite Schist
26	Structure	Nil
27	Landuse/ Landcover	Extensive slope cut
28	Hydrological condition	Dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Forest
36	Geo-scientific Causes	The slope modified for road construction by way of trenching.
37	Remedial measures	Construction of breast wall, easing of the slope and shifting of the road towards the hill side.
38	Remarks, if any	Nil
39	Summary/Abstract	Slope modified for road construction, trenching and the

		slope left as vertically by without any to support
40	Date of Reporting	15-02-2020
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	134
1	Slide No.	KAR/SG/48O1/2019/134
2	Latitude (N)	13.8448
3	Longitude (E)	75.0041
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Brahmanwada
8	NH/SH/LocalityLocality-Brahmanwada	
9	Length (m)	15
10	Width (m)	45
11	Height (m)	12
12	Area (m)	675
13	Depth (m)	0.5
14	Volume (m)	337.5
15	Run out distance (m)	Nil
16	Type of Material	Debris
17	Type of movement	Slide
18	Rate of movement	Slow
19	Activity	Stabilized
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Lowly dissected slope
25	Geology/Lithology	Metabasalt
26	Structure	Nil
27	Landuse/ Landcover	Moderate vegetation
28	Hydrological condition	Dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Forest
36	Geo-scientific Causes	Steep slope and incessant rainfall.
37	Remedial measures	Easing of the slope and maintaining of the slope are recommended.
38	Remarks, if any	Nil
39	Summary/Abstract	The landslide occurred on lowly dissected steep slope. It is stabilized and now there is no any visible movement.

		Easing of the slope and maintaining of the slope are recommended.
40	Date of Reporting	15-02-2020
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	135
1	Slide No.	KAR/SG/48O1/2019/135
2	Latitude (N)	13.8428
3	Longitude (E)	75.0097
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Brahmanwada-1
8	NH/SH/Locality	Locality-Brahmanwada
9	Length (m)	18
10	Width (m)	30
11	Height (m)	15
12	Area (m)	540
13	Depth (m)	2
14	Volume (m)	1080
15	Run out distance (m)	Nil
16	Type of Material	Debris
17	Type of movement	slide
18	Rate of movement	Slow
19	Activity	Reactivated
20	Distribution	Retrogressive
21	Style	Successive
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Moderately dissected slope
25	Geology/Lithology	Quartz-Chlorite Schist
26	Structure	Nil
27	Landuse/ Landcover	Thick vegetation
28	Hydrological condition	Dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Forest
36	Geo-scientific Causes	Vertical slope coupled with incessant rainfall, toe cut are the main causes for the slide.
37	Remedial measures	Removal of the debris, easing of the slope and construction of channel drain are recommended.
38	Remarks, if any	Nil
39	Summary/Abstract	Vertical slope coupled with incessant rainfall, toe cut are the main causes for the slide. Removal of the debris,

		easing of the slope and construction of channel drain are recommended.
40	Date of Reporting	15-02-2020
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	136
1	Slide No.	KAR/SG/48O1/2019/136
2	Latitude (N)	13.8381
3	Longitude (E)	75.0124
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Netrabailu
8	NH/SH/Locality Locality-Netrabailu	
9	Length (m)	20
10	Width (m)	30
11	Height (m)	15
12	Area (m)	600
13	Depth (m)	2
14	Volume (m)	1200
15	Run out distance (m)	Nil
16	Type of Material	Debris
17	Type of movement	slide
18	Rate of movement	Slow
19	Activity	Reactivated
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Moderately dissected slope
25	Geology/Lithology	Metabasalt
26	Structure	Nil
27	Landuse/ Landcover	Thick vegetation
28	Hydrological condition	Dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Forest
36	Geo-scientific Causes	Vertical slope coupled with incessant rainfall, toe cut are the main causes for the slide.
37	Remedial measures	Removal of the debris, easing of the slope and construction of channel drain are recommended.
38	Remarks, if any	Nil
39	Summary/Abstract	The debris slide initiated since 2017 and since then reactivated every year. The length width and height of the

		slide is 20m, 30m, 15m respectively. Vertical slope coupled with incessant rainfall, toe cut are the main causes for the slide. Removal of the debris, easing of the slope and construction of channel drain recommended.
40	Date of Reporting	15-02-2020
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	137
1	Slide No.	KAR/SG/48O1/2019/138
2	Latitude (N)	13.8364
3	Longitude (E)	75.0134
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Netrabailu-1
8	NH/SH/Locality Locality-Netrabailu	
9	Length (m)	12
10	Width (m)	20
11	Height (m)	8
12	Area (m)	240
13	Depth (m)	1
14	Volume (m)	240
15	Run out distance (m)	Nil
16	Type of Material	Soil
17	Type of movement	slide
18	Rate of movement	Slow
19	Activity	Reactivated
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Moderately dissected slope
25	Geology/Lithology	Metabasalt
26	Structure	Nil
27	Landuse/ Landcover	Thick vegetation
28	Hydrological condition	Dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Forest
36	Geo-scientific Causes	Vertical slope coupled with incessant rainfall, toe cut are the main causes for the slide.
37	Remedial measures	Removal of the debris, easing of the slope and construction of channel drain are recommended.
38	Remarks, if any	Nil
39	Summary/Abstract	The soil slide initiated since 2017 and since then reactivated every year. Vertical slope coupled with

		incessant rainfall, toe cut are the main causes for the slide. Removal of the debris, easing of the slope and construction of channel drain are recommended.
40	Date of Reporting	15-02-2020
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K
		



S. No.	Slide No.	138
1	Slide No.	KAR/SG/48O1/2019/138
2	Latitude (N)	13.8385
3	Longitude (E)	75.0261
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Devagange
8	NH/SH/Locality Locality-Devagange	
9	Length (m)	20
10	Width (m)	25
11	Height (m)	15
12	Area (m)	500
13	Depth (m)	2
14	Volume (m)	1000
15	Run out distance (m)	Nil
16	Type of Material	Debris
17	Type of movement	slide
18	Rate of movement	Slow
19	Activity	Reactivated
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Lowly dissected slope
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	Thick vegetation
28	Hydrological condition	Dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Forest
36	Geo-scientific Causes	Vertical slope coupled with incessant rainfall increased the pore pressure, toe cut and weak slope forming material in the steep slope are the main causes for the slide.
37	Remedial measures	Removal of the debris and easing of the slope is recommended.
38	Remarks, if any	Nil

39	Summary/Abstract	The soil slide initiated since 2015 and since then reactivated every year. Vertical slope coupled with incessant rainfall increased the pore pressure, toe cut and weak slope forming material in the steep slope are the main causes for the slide. Removal of the debris, easing of the slope are recommended
40	Date of Reporting	15-02-2020
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



1851

S. No.	Slide No.	139
1	Slide No.	KAR/SG/48O1/2019/139
2	Latitude (N)	13.8184
3	Longitude (E)	75.029
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Nagar
8	NH/SH/Locality	SH-52
9	Length (m)	9
10	Width (m)	12
11	Height (m)	7
12	Area (m)	108
13	Depth (m)	1
14	Volume (m)	108
15	Run out distance (m)	Nil
16	Type of Material	Debris
17	Type of movement	slide
18	Rate of movement	Slow
19	Activity	Active
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	Aug 2019
24	Geomorphology	Rolling plain
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	Settlement on modified slope
28	Hydrological condition	Dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	1 house totally damaged and 3 house partially damaged
35	Agriculture/forest/Barren	Settlement
36	Geo-scientific Causes	The slope modified to construct the settlement and the slope left as vertical cut without any toe support.
37	Remedial measures	Shifting of the house recommended and easing of the slope, construction of retaining wall is also recommended.
38	Remarks, if any	1 house totally damaged and 3 houses partially damaged.
39	Summary/Abstract	The slope failure initiated since 2018 and reactivated in

		2019. The slope modified to construct the settlement and the slope left as vertical cut without any toe support. Shifting of the house recommended and easing of the slope, construction of retaining wall is also recommended. 1 house totally damaged and 3 houses partially damaged.
40	Date of Reporting	15-02-2020
41	Landslide Category	Category-I
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	140
1	Slide No.	KAR/SG/48O5/2019/140
2	Latitude (N)	13.9203
3	Longitude (E)	75.4153
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/5
7	Name of the slide	Maleshankara Gudi
8	NH/SH/Locality Locality-Maleshankara Gudi	
9	Length (m)	30
10	Width (m)	20
11	Height (m)	25
12	Area (m)	600
13	Depth (m)	1.5
14	Volume (m)	900
15	Run out distance (m)	120
16	Type of Material	Debris
17	Type of movement	Flow
18	Rate of movement	Rapid
19	Activity	Active
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	8th Aug 2019
24	Geomorphology	Moderately dissected slope
25	Geology/Lithology	Ferruginous phyllite
26	Structure	Nil
27	Landuse/ Landcover	Thick vegetation
28	Hydrological condition	Dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Forest
36	Geo-scientific Causes	Steep slope and the inter face between the soil and bed rock is very less, incessant rainfall percolated into the soil.
37	Remedial measures	Maintaining of the natural stream flow.
38	Remarks, if any	
39	Summary/Abstract	Steep slope and the inter face between the soil and bed rock is very less, incessant rainfall percolated into the

		soil. Maintaining of the natural stream flow is recommended.
40	Date of Reporting	17-02-2020
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	141
1	Slide No.	KAR/SG/48O5/2019/141
2	Latitude (N)	13.9152
3	Longitude (E)	75.4218
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/5
7	Name of the slide	Maleshankara Gudi-1
8	NH/SH/Locality	Locality-Maleshankara Gudi
9	Length (m)	15
10	Width (m)	12
11	Height (m)	12
12	Area (m)	180
13	Depth (m)	0.5
14	Volume (m)	90
15	Run out distance (m)	30
16	Type of Material	Debris
17	Type of movement	Flow
18	Rate of movement	Rapid
19	Activity	Active
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	8th Aug 2019
24	Geomorphology	Moderately dissected slope
25	Geology/Lithology	Ferruginous phyllite
26	Structure	Nil
27	Landuse/ Landcover	Thick vegetation
28	Hydrological condition	Dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Forest
36	Geo-scientific Causes	Highly jointed rock and Steep slope and the inter face between the soil and bed rock is very less, incessant rainfall are the causes for the slide
37	Remedial measures	Maintaining of the natural stream flow.
38	Remarks, if any	
39	Summary/Abstract	Highly jointed rock and Steep slope and the inter face between the soil and bed rock is very less, incessant

		rainfall are the causes for the slide. Maintaining of the natural stream flow.
40	Date of Reporting	17-02-2020
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	142
1	Slide No.	KAR/SG/48O5/2019/142
2	Latitude (N)	13.8367
3	Longitude (E)	75.4639
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/5
7	Name of the slide	Mudalumane
8	NH/SH/Locality Locality- Mudalumane	
9	Length (m)	30
10	Width (m)	50
11	Height (m)	25
12	Area (m)	1500
13	Depth (m)	3
14	Volume (m)	4500
15	Run out distance (m)	40
16	Type of Material	Debris
17	Type of movement	Flow
18	Rate of movement	Rapid
19	Activity	Active
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	9th Aug 2019
24	Geomorphology	Moderately dissected slope
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	Sparse vegetation
28	Hydrological condition	Dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Forest
36	Geo-scientific Causes	Steep slope and the inter face between the soil and bed rock is very less, incessant rainfall increased the pore water pressure and percolation of water in between the rock and overburden acted as weak plane.
37	Remedial measures	Maintaining of the natural stream flow.
38	Remarks, if any	
39	Summary/Abstract	Steep slope and the inter face between the soil and bed

		rock is very less, incessant rainfall increase the pore water pressure and percolation of water in between the rock and overburden act as weak plane. Maintaining of the natural stream flow.
40	Date of Reporting	17-02-2020
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	143
1	Slide No.	KAR/SG/48O1/2019/143
2	Latitude (N)	13.9252
3	Longitude (E)	75.1487
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/1
7	Name of the slide	Helekote
8	NH/SH/Locality Locality- Helekote	
9	Length (m)	15
10	Width (m)	50
11	Height (m)	10
12	Area (m)	750
13	Depth (m)	1
14	Volume (m)	750
15	Run out distance (m)	Nil
16	Type of Material	Soil
17	Type of movement	slide
18	Rate of movement	Slow
19	Activity	Active
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	8th Aug 2019
24	Geomorphology	Moderately dissected slope
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	Thick vegetation
28	Hydrological condition	Dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Agriculture
36	Geo-scientific Causes	Vertical slope, incessant rainfall increased the pore water pressure in the soil and toe cut by the stream.
37	Remedial measures	Removal of the debris, easing of the slope and channelizing the stream are recommended.
38	Remarks, if any	
39	Summary/Abstract	Vertical slope, incessant rainfall increase the pore water pressure in the soil and toe cut by the stream. Removal of

		the debris, easing of the slope and channelizing the stream are recommended.
40	Date of Reporting	21-02-2020
41	Landslide Category	Category-III
42	Citation	Resya Reghu and Senthilkumar.K



S. No.	Slide No.	144
1	Slide No.	KAR/SG/48O5/2019/144
2	Latitude (N)	13.8354
3	Longitude (E)	75.4637
4	State	Karnataka
5	District	Shivamoga
6	Toposheet No.	48O/5
7	Name of the slide	Hegalathi
8	NH/SH/Locality Locality- Hegalathi	
9	Length (m)	30
10	Width (m)	25
11	Height (m)	60
12	Area (m)	750
13	Depth (m)	1.5
14	Volume (m)	1125
15	Run out distance (m)	60
16	Type of Material	Debris
17	Type of movement	Flow
18	Rate of movement	Rapid
19	Activity	Active
20	Distribution	Retrogressive
21	Style	Single
22	Failure mechanism	Shallow translational Failure
23	History	8th Aug 2019
24	Geomorphology	Moderately dissected slope
25	Geology/Lithology	Granite Gneiss
26	Structure	Nil
27	Landuse/ Landcover	Sparse vegetation
28	Hydrological condition	Dry
29	Triggering Factor	Rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Livestock Loss	Nil
33	Communication	Nil
34	Infrastructure	Nil
35	Agriculture/forest/Barren	Forest
36	Geo-scientific Causes	Incessant rainfall is the triggering factor. The predisposing factors are steep slope, weathered rock and interface between the overburden and bedrock is very low.
37	Remedial measures	Maintaining of the natural stream flow and from the left flank one settlement situated. During the rainfall that settlement should be relocated. Avoid construction of settlement towards the flow direction.

38	Remarks, if any	
39	Summary/Abstract	Incessant rainfall is the triggering factor. The predisposing factors are steep slope, weathered rock and interface between the overburden and bedrock is very low. Maintaining of the natural stream flow and from the left flank one settlement situated. During the rainfall that settlement should be relocated. Avoid construction of settlement towards the flow direction.
40	Date of Reporting	07-11-2019
41	Landslide Category	Category-II
42	Citation	Resya Reghu and Senthilkumar.K



Annexure – III Calculation of LOFS and consistency ratio (CR) for all factor maps

Geofactor: Geomorphology

Rank of Geomorphology Classes

SI No	Class Name	Code	Rank
1	Lowly Dissected Slope	LDS	4
2	Moderately Dissected Slope	MDS	6
3	Ridge - top	RT	0
4	Rolling Plain	RP	0
5	Valley Fill	VF	0
6	Pediment – Pediplain Complex	PPC	0
7	Hilltop	HT	0
8	Water body	WB	0

Geofactor: Geomorphology

Matrix of Pairwise Ratings of Geomorphology Class

GEOM	DS	ESC	MOUND	CFS	LDS	MDS	HDS	PIED SLOPE
DS	1.00	8.00	8.00	7.00	6.00	4.00	2.00	6.00
ESC	0.13	1.00	1.00	0.50	0.33	0.20	0.14	0.33
MOUND	0.13	1.00	1.00	0.50	0.33	0.20	0.14	0.33
CFS	0.14	2.00	2.00	1.00	0.50	0.25	0.17	0.50
LDS	0.17	3.00	3.00	2.00	1.00	0.33	0.20	1.00
MDS	0.25	5.00	5.00	4.00	3.00	1.00	0.33	3.00
HDS	0.50	7.00	7.00	6.00	5.00	3.00	1.00	5.00
PIED SLOPE	0.17	3.00	3.00	2.00	1.00	0.33	0.20	1.00
Sum Column	2.48	30.00	30.00	23.00	17.17	9.32	4.19	17.17

GEOM	DS	ESC	MOUND	CFS	LDS	MDS	HDS	PIED SLOPE	Sum Rows	Frac Weight	LOFS
DS	0.4038	0.2667	0.2667	0.3043	0.3495	0.4293	0.4778	0.3495	2.8477	0.3560	1.0000
ESC	0.0505	0.0333	0.0333	0.0217	0.0194	0.0215	0.0341	0.0194	0.2333	0.0292	0.0819
MOUND	0.0505	0.0333	0.0333	0.0217	0.0194	0.0215	0.0341	0.0194	0.2333	0.0292	0.0819
CFS	0.0577	0.0667	0.0667	0.0435	0.0291	0.0268	0.0398	0.0291	0.3594	0.0449	0.1262
LDS	0.0673	0.1000	0.1000	0.0870	0.0583	0.0358	0.0478	0.0583	0.5543	0.0693	0.1947
MDS	0.1010	0.1667	0.1667	0.1739	0.1748	0.1073	0.0796	0.1748	1.1447	0.1431	0.4020
HDS	0.2019	0.2333	0.2333	0.2609	0.2913	0.3220	0.2389	0.2913	2.0729	0.2591	0.7279
PIED SLOPE	0.0673	0.1000	0.1000	0.0870	0.0583	0.0358	0.0478	0.0583	0.5543	0.0693	0.1947

Geofactor: Geomorphology

Estimation of consistency vector (CV), consistency index (CI) and consistency ratio (CR) for Geomorphology classes

[illegible]

Geofactor: Slope Forming Material (SFM)
Rank of SFM Classes

Sl No	Class Name	Code	Rank
1	In – situ Soil	IS	4
2	Loose Slide Debris	LSD	8
3	Rock Class Type – I	R - I	1
4	Rock Class Type – II	R - II	2
5	Rock Class Type – III	R - III	4
6	Transported Soil	TS	3
7	Water	WT	0

Rock class type-I

Dolerite, Ferruginous phyllite, Gabbro, Granite gneiss, Limestone, Magniferous iron quartzite, Metaultramafite, Metabasalt, Quartzite, Ultramafite, Banded magnetite quartzite.

Rock class type-III

Ferruginous phyllite, Quartz-chlorite schist, Rhyolite, Amphibolite, Conglomerate.

Geofactor: Slope Forming Material (SFM)

Matrix of Pairwise Ratings of SFM Class

SFM	CSD	IS	CL	LSD	R - I	R - II	R - III	TS	WR
CSD	1.00	0.50	0.33	0.17	3.00	2.00	0.50	1.00	0.25
IS	2.00	1.00	0.50	0.20	4.00	3.00	1.00	2.00	0.33
CL	3.00	2.00	1.00	0.25	5.00	4.00	2.00	3.00	0.50
LSD	6.00	5.00	4.00	1.00	8.00	7.00	5.00	6.00	3.00
R - I	0.33	0.25	0.20	0.13	1.00	0.50	0.25	0.33	0.17
R - II	0.50	0.33	0.25	0.14	2.00	1.00	0.33	0.50	0.20
R - III	2.00	1.00	0.50	0.20	4.00	3.00	1.00	2.00	0.33
TS	1.00	0.50	0.33	0.17	3.00	2.00	0.50	1.00	0.25
WR	4.00	3.00	2.00	0.33	6.00	5.00	3.00	4.00	1.00
Sum Column	19.83	13.58	9.12	2.58	36.00	27.50	13.58	19.83	6.03

Estimated Eigen values, fraction rate and LOFS for SFM classes

SFM	CSD	IS	CL	LSD	R - I	R - II	R - III	TS	WR	Sum Rows	Frac Weight	LOFS
CSD	0.0504	0.0368	0.0366	0.0645	0.0833	0.0727	0.0368	0.0504	0.0414	0.4730	0.0526	0.1506
IS	0.1008	0.0736	0.0548	0.0774	0.1111	0.1091	0.0736	0.1008	0.0552	0.7566	0.0841	0.2409
CL	0.1513	0.1472	0.1097	0.0967	0.1389	0.1455	0.1472	0.1513	0.0829	1.1706	0.1301	0.3727
LSD	0.3025	0.3681	0.4388	0.3869	0.2222	0.2545	0.3681	0.3025	0.4972	3.1409	0.3490	1.0000
R - I	0.0168	0.0184	0.0219	0.0484	0.0278	0.0182	0.0184	0.0168	0.0276	0.2143	0.0238	0.0682
R - II	0.0252	0.0245	0.0274	0.0553	0.0556	0.0364	0.0245	0.0252	0.0331	0.3073	0.0341	0.0978
R - III	0.1008	0.0736	0.0548	0.0774	0.1111	0.1091	0.0736	0.1008	0.0552	0.7566	0.0841	0.2409
TS	0.0504	0.0368	0.0366	0.0645	0.0833	0.0727	0.0368	0.0504	0.0414	0.4730	0.0526	0.1506
WR	0.2017	0.2209	0.2194	0.1290	0.1667	0.1818	0.2209	0.2017	0.1657	1.7077	0.1897	0.5437

Estimation of consistency vector (CV), consistency index (CI) and consistency ratio (CR) for SFM classes

[illegible]

Geofactor: Regolith Thickness
Rank of Regolith Thickness Classes

Sl No	Class Name	Code	Rank
1	< 0.5 m	< 0.5 m	0
2	0.5 m – 5 m	0.5 m – 5 m	7
3	5 m – 10 m	5 m – 10 m	4
4	> 10 m	> 10 m	2

Matrix of Pairwise Ratings of Regolith Thickness Class

Regolith Thickness	0.5 – 5 m	5 – 10 m	> 10 m
0.5 – 5 m	1.00	4.00	6.00
5 – 10 m	0.25	1.00	3.00
> 10 m	0.17	0.33	1.00
Sum Column	1.42	5.33	10.00

Geofactor: Regolith Thickness

Estimated Eigen values, fraction rate and LOFS for Regolith Thickness classes

Regolith Thickness	0.5 – 5 m	5 – 10 m	> 10 m	Sum Rows	Frac Weight	LOFS
0.5 – 5 m	0.705882	0.75	0.6	2.055882	0.685294	1.0000
5 – 10 m	0.176471	0.1875	0.3	0.663971	0.221324	0.3230
> 10 m	0.117647	0.0625	0.1	0.280147	0.093382	0.1363

Estimation of consistency vector (CV), consistency index (CI) and consistency ratio (CR) for Regolith Thickness classes

Regolith Thickness	0.5 – 5 m	5 – 10 m	> 10 m	Sum Rows	CV
0.5 – 5 m	0.685294	0.885294	0.560294	2.130882	3.109442
5 – 10 m	0.171324	0.221324	0.280147	0.672794	3.039867
> 10 m	0.114216	0.073775	0.093382	0.281373	3.013123
				Sum CV	9.162433
Mean Consistency Vector (Mean CV) = Total CV/ Nos. Of factor class (9.162433/3) =					3.054144
Consistency Index (CI) = (Mean CV - No. Of criteria/ factor class) / (No. Of factor class - 1) =					0.027072
Consistency Ratio (CR) = CI/ RI = 0.027072 / 0.58 =					0.0467

[illegible]

Slope Class	< 15°	15° - 25°	25° - 35°	35° - 45°	> 45°
< 15°	1.00	0.33	0.20	0.50	1.00
15° - 25°	3.00	1.00	0.33	2.00	3.00
25° - 35°	5.00	3.00	1.00	4.00	5.00
35° - 45°	2.00	0.50	0.25	1.00	2.00
> 45°	1.00	0.33	0.20	0.50	1.00
Sum Column	12.00	5.17	1.98	8.00	12.00

[illegible][illegible]

Geofactor: Slope Curvature
Rank of Slope Curvature Classes

SI No	Class Name	Code	Rank
1	< -0.1	Concave	4
2	-0.1 – 0.1	Flat	2
3	> 0.1	Convex	6

Matrix of Pairwise Ratings of Slope Curvature Class

Slope Curvature	Concave	Flat	Convex
Concave	1.00	3.00	0.33
Flat	0.33	1.00	0.20
Convex	3.00	5.00	1.00
Sum Column	4.33	9.00	1.53

Geofactor: Slope Curvature
Estimated Eigen values, fraction rate and LOFS for Slope Curvature classes

Slope Curvature	Concave	Flat	Convex	Sum Rows	Frac Weight	LOFS
Concave	0.230769	0.333333	0.217391	0.781494	0.260498	0.4113
Flat	0.076923	0.111111	0.130435	0.318469	0.106156	0.1676
Convex	0.692308	0.555556	0.652174	1.900037	0.633346	1.0000

Estimation of consistency vector (CV), consistency index(CI) and consistency ratio (CR) for Slope Angle classes

Slope Curvature	Concave	Flat	Convex	Sum Rows	CV
Concave	0.260498	0.318469	0.211115	0.790082	3.032969
Flat	0.086833	0.106156	0.126669	0.319658	3.011202
Convex	0.781494	0.530782	0.633346	1.945621	3.071973
				Sum CV	9.116144
				Mean Consistency Vector (Mean CV) = Total CV/ Nos. Of factor class (9.116144/3) =	3.038715
				Consistency Index (CI) = (Mean CV - No. Of criteria/ factor class) / (No. Of factor class - 1) =	0.019357
				Consistency Ratio (CR) = CI/ RI = 0.019357 / 0.58 =	0.0334

Factor Class
Rank of Factor Classes

Sl No	Factor Class Name	Code	Rank
1	Slope	SLP	9
2	Curvature	CUR	2
3	Slope Forming Material	SFM	6
4	Land Use Land Cover	LULC	8
5	Geomorphology	GEOM	6
6	Regolith Thickness	RT	4

Matrix of Pairwise Ratings of Factor Class

Factor Class	SLP	CUR	SFM	LULC	GEOM	RT
SLP	1.00	8.00	4.00	2.00	4.00	6.00
CUR	0.13	1.00	0.20	0.14	0.20	0.33
SFM	0.25	5.00	1.00	0.33	1.00	3.00
LULC	0.50	7.00	3.00	1.00	3.00	5.00
GEOM	0.25	5.00	1.00	0.33	1.00	3.00
RT	0.17	3.00	0.33	0.20	0.33	1.00
Sum Column	2.29	29.00	9.53	4.01	9.53	18.33

Factor Class
Estimated Eigen values, fraction rate and Weight for Factor classes

Factor Class	SLP	CUR	SFM	LULC	GEOM	RT	Sum Rows	Frac Weight	Weight
SLP	0.43636	0.27586	0.41958	0.49881	0.41958	0.32727	2.37747	0.396245271	12.86527835 ~ 13
CUR	0.05455	0.03448	0.02098	0.03563	0.02098	0.01818	0.18480	0.030799588	1 ~ 1
SFM	0.10909	0.17241	0.10490	0.08314	0.10490	0.16364	0.73807	0.123011111	3.993920696 ~ 4
LULC	0.21818	0.24138	0.31469	0.24941	0.31469	0.27273	1.61107	0.268510868	8.718001981 ~ 9
GEOM	0.10909	0.17241	0.10490	0.08314	0.10490	0.16364	0.73807	0.123011111	3.993920696 ~ 4
RT	0.07273	0.10345	0.03497	0.04988	0.03497	0.05455	0.35053	0.058422051	1.896845233 ~ 2

Estimation of consistency vector (CV), consistency index (CI) and consistency ratio (CR) for Factor classes

Factor Class	SLP	CUR	SFM	LULC	GEOM	RT	Sum Rows	CV
SLP	0.396245271	0.246396703	0.492044445	0.537021735	0.492044445	0.350532308	2.514284907	6.345274237
CUR	0.049530659	0.030799588	0.024602222	0.038358695	0.024602222	0.019474017	0.187367404	6.083438671
SFM	0.099061318	0.153997939	0.123011111	0.089503623	0.123011111	0.175266154	0.763851256	6.209611865
LULC	0.198122635	0.215597115	0.369033334	0.268510868	0.369033334	0.292110257	1.712407542	6.377423591
GEOM	0.099061318	0.153997939	0.123011111	0.089503623	0.123011111	0.175266154	0.763851256	6.209611865
RT	0.066040878	0.092398763	0.041003704	0.053702174	0.041003704	0.058422051	0.352571274	6.034900625
Sum CV								37.2603
Mean Consistency Vector (Mean CV) = Total CV/ Nos. Of factor class (37.2603/6) =								6.210043
Consistency Index (CI) = (Mean CV - No. Of criteria/ factor class) / (No. Of factor class - 1) =								0.042009
Consistency Ratio (CR) = CI/ RI = 0.042009 / 1.24 =								0.033878

