NOTE ON POST DISASTER STUDIES FOR LANDSLIDES OCCURRED IN JUNE 2018 AT KOZHIKODE, WAYANAD AND KANNUR DISTRICTS, KERALA

Field Season 2018-2019

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During heavy downpour in the second week of June 2018, a number of landslide incidences were reported in various parts of northern Kerala. Being the nodal agency for landslide studies in the country, Geological Survey of India responded immediately and carried out post disaster landslide studies to assess the slides, evaluate the causative factors and to suggest possible remedial measures. During this study, the landslide inventory details of Kozhikode, Wayanad and Kannur districts have been collected on a 42-point geo-parametric datasheet. A total of 36 nos. of landslide incidences were inventoried including 27 in Kozhikode, 8 in Wayanad and one in Kannur districts. The district wise details of different type of landslide incidences are as follows:

Landslide Type	Kozhikode	Wayanad	Kannur
Debris Flow	14	K 3	1 /
Debris Slide	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	3	-/
Earth Slide	779	3	11/
Debris cum rock flow	1 1	1/3	MIL
Rock cum debris slide	0.01	1//	NA D
TOTAL	27	8	

Kozhikode is the worst affected among these three districts with respect to the number of landslide incidences, casualties and property loss. The Karinchola mala landslide in Kattipara Panchayat, Kozhikode District is the most devastating with 14 casualties besides huge property loss. The other flank of the same hill also witnessed huge debris flow event. In Wayanad District, out of the 8 nos. of the landslide incidences inventoried, Achoor (6th mile) and Veetikunnu landslides seems to be more damaging

with one casualty and huge property loss. During this post disaster landslide studies, one debris flow incidence (Parakkamala landslide) which is a reactivated one (earlier in July 2007) has also been collected from Ayyankunnu Panchayat of Kannur District. It is inferred from the site conditions that the instability in the slope has been induced by reduction of strength on saturation and increase in pore water pressure. The heavy downpour prior to landslide owing to oversaturation of slope forming material and development of high hydrostatic pressure resulted in these landslide events.

LANDSLIDE INVENTORY ASSESSMENTS

1. Kozhikode District

A total of twenty seven major landslide incidences were reported from Kozhikode District (Fig. 1). The Karinchola mala slide, which occurred on 14th June 2018 at 05:00 hrs is a complex one which caused 14 casualties besides huge property loss. This slide is of debris flow type initiated as planar translational debris slide and later transformed to debris flow with four prominent run-out chutes.

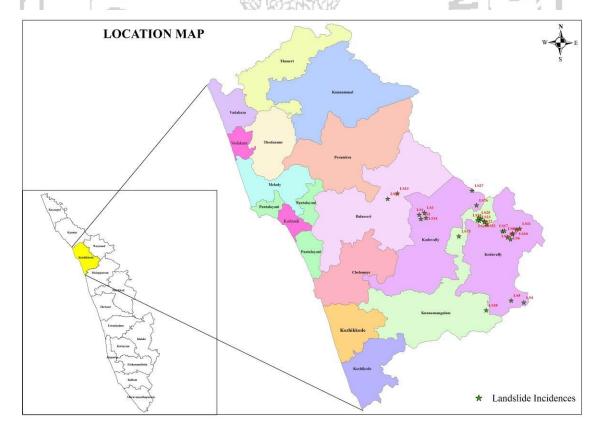


Fig. 1: Location of landslide incidences at Kozhikode District

The details of the geo-technical investigation carried out at Karinchola mala is described below:

Karinchola mala Landslide

Karinchola mala forms part of a 2 km long ridge whose flanks are of steeply to moderately sloping with a maximum elevation of about +435 m from a datum of about 65 m. The ridge at its upper reaches forms an escarpment with negligible soil cover and a break in slope at its toe area from where slope grades into moderate. The area has been witnessing slope failures from the past and during the monsoon of 2018, the area suffered number of landslides on both flanks. The one at Karinchola mala (75° 55' 17" E, 11° 28' 15" N) claimed 14 lives besides complete damage of plantation and property (Figs. 2, 3 & 4). The landslide investigation studies hinted an interesting mechanism of failures which originally initiated as debris slide probably due to excess cleft water pressure in the discontinuities from the toe of the escarpment, which progressively gathered the nature of a soil / debris flow by shearing the super-saturated loose overburden media in its path. The distressed material flows through four prominent run-out chutes (Fig. 5). The detached rock boulders are of the size in the order of even 14 m x 7 m x 5 m. The overburden thickness is hardly up to about 2 m in the southern flank whereas it is slightly more in the north. The controls of the joints / discontinuities are obvious in the incident, that they form huge potential rock blocks prone to sliding.

Geomorphologically, the area forms part of the lowly dissected slope. Hornblende biotite gneiss and migmatite with pegmatite veins are the predominant rock units exposed in the area. Mylonite bands are also present (Fig. 6). Foliation, foliation parallel joints and four other sets of joints are the predominant discontinuities deciphered in the rock mass. The general foliation is dipping 80° towards N 100°. Four sets of prominent joints are:

- 1. Foliation parallel joint
- 2. Joint dipping 56° towards N 100°
- 3. Joint dipping 30° towards N 155° (Valley dipping)
- 4. Joint dipping 32° towards N 80°
- 5. Joint dipping 85° towards N 64° (open penetrative joint along one of the run-out chutes in the left flank)

Though five sets of prominent joints are present in the total rock mass, at a given location only two to three sets are generally noticed.

Landslide initiated as planar failure at the contact between rock and overburden in the form of debris slide and then transformed into debris flow and discharged through four run-out chutes. It accounts for a death of 14 persons including children. During the downward flow it totally washed out five houses and three houses got partly damaged at downslope area (Figs. 7 & 8). Four persons were severely injured and livestocks were also affected. The entire vegetation and plantation along the hill slope area got washed out during this slide and the material got transported up to a distance of about 620 m from the crown (Figs. 9 & 10). The approach road located downslope of the Karinchola mala, its RR masonry retaining wall, the culverts at the road level, electric transmission lines, electric poles and 2 nos. of transformers were washed away (Figs. 11 & 12). One motor car is also trapped in the debris material. The slide initiated as a planar failure with the slide plane dipping 35° towards N 176° (Fig. 13). One penetrative sub-vertical joint is present along one of the chutes on the left flank which passes through the entire length of the slide plane (Fig. 14).

During field investigation it is observed that a number of precarious rock boulders are perched within the distressed zone (Fig. 15). The details of the prominent precarious boulders on the slide plane are as follows:

Sl. No.	Boulder	Location (Latitude; Longitude)	Dimension (L x W x H)
1	Boulder - 1	75.9214; 11.4706	4m x 3m x 2m
2	Boulder - 2	72.9215; 11.4698	15m x 12m x 7m
3	Boulder - 3	75.9212; 11.4697	4.5m x 1.5m x 1.5m
4	Boulder - 4	75.9215; 11.4696	6m x 2.5m x 3.5m
5	Boulder - 5	75.9213; 11.4693	4m x 1.5m x 1.5m
6	Boulder – 6	75.9218; 11.4687	14m x 7m x 5m
7	Boulder – 7	75.9218; 11.4687	6m x 3.5m x 2m
8	Boulder – 8	75.9215; 11.4684	13m x 11m x 5m
9	Boulder – 9	75.9220; 11.4683	4m x 3m x 2m
10	Boulder – 10	75.9214; 11.4678	3m x 0.5m x 2m

These precarious boulders present along the slide plane are to be removed immediately. Debris material along the naturally occurring nala on the right flank of the landslide has to be removed and the free flow of water through it may be restored.

A vertical rockcut observed below the crown area may have disturbed the toe which is inferred as one of the causative factors (Fig. 16). The depression made by this rockcut to hold huge amount of water at that level may have breached due to the impact of huge rock boulder transported from upslope (Fig. 17) augmented the intensity of the landslide. During this slide most of the debris material present on the hill slope has been washed out and the rock outcrop is exposed at several places. The threat of downward movement of the remaining disturbed material and the huge rock blocks are still there and it is advised to avoid habitations in this slope. The material and the rock blocks may be removed and it is also suggested that a detailed geo-technical study of the distressed portion and adjacent area may be conducted prior to any construction or development work at this location.



Fig. 2: Distant view of Karinchola mala landslide



Fig. 3: Close view of Karinchola mala landslide



Fig. 4: View towards uphill - Karinchola mala landslide



Fig. 5: Flow chutes through which debris material flown

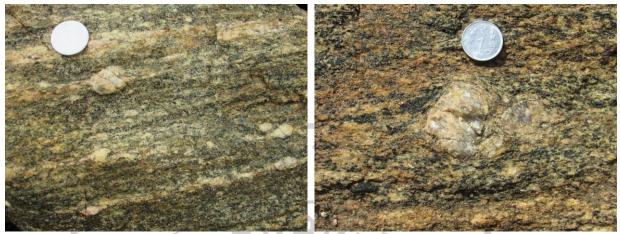


Fig. 6: Mylonites representing shear zone exposed at the landslide plane



Fig. 7: Location of the houses washed out during the landslide the landslide







Fig. 9: View from crown towards the toe portion of the landslide **Fig. 10:** Accumulation zone of the Karinchola mala landslide.



Fig. 11: Damaged RR masonry retaining wall of the road.

Fig. 12: Damaged road and culvert due to the debris flow







Fig. 13: Crown portion of the Karinchola mala and slide Fig. 14: Sub-vertical penetrative joint along one of the debris chutes exposed on the left flank







Fig. 15: Precarious boulders of various sizes observed along the slide plane



Fig. 16: Sharp rock cut at top of the hill



Fig. 17: Huge rock boulder whose impact probably caused the breaching of the collected water in the rock cut depression.

The details of all the landslides studied in the district are given in Annexure I.

2. Wayanad District

During this period, a total of 8 nos. of landslide incidences has been collected as part of the post disaster landslide studies in Wayanad district. On the basis of the type of

incidences, there are 3 nos. of each in earth and debris slide, one in debris flow and remaining one in rock cum debris slide type. The details of all these landslide incidences are collected on a 42-point geo-parametric sheet for landslide inventory and given in Annexure - 1.

3. Kannur District

Only one landslide incidence is reported from Kannur district which is a debris flow type. The details are given in Annexure -1. The Makkootam area got flooded due to landslide incidences occurred in deep forest in the Kerala-Karnataka border.

(ANNEXURE-I)

Slide-1:

No	Field		Description
1	Slide No.	:	KER/KKD/49M15/2018/01
2	State	:	Kerala
3	District	:	Kozhikode
4	Toposheet No.	:	49 M/15
5	Name of the slide	:	Karinchola mala slide
6	NH/SH/Locality	:	Punur – Kattipara road
7	Latitude	:	11.4708
8	Longitude	7	75.9213
9	Length	1)	260 m
10	Width		60 m (Measured at middle portion of the slide)
11	Height	1	130 m
12	Area	į.	$15600 m^2$
13	Depth	10	3 m
14	Volume		$46800 m^3$
15	Runout distance	- 6	360 m
16	Type of Material	:	Debris
17	Type of movement	: ,	Flow
18	Rate of movement	Ć	Extremely rapid
19	Activity		Active
20	Distribution		Confined
21	Style	1	Complex
22	Failure mechanism	-	Shallow planar ($\leq 5m$) failure
23	History	-	14 th June 2018 (05:00 hrs)
24	Geomorphology		Lowly dissected slope. Landslide occurred in the southern
			flank of the Karinchola mala and slide flow is towards N
			170°.
25	Geology/Lithology	:	Hornblende biotite gneiss and migmatite with pegmatite veins
			at places. Mylonite bands are also present.
26	Structure	:	Foliation dipping 80° towards N 100°. Joint planes: Dipping
			56° towards N 100°, Dipping 30° towards N 155° (Valley
			dipping), Dipping 85° towards N 60°, Dipping 32° towards N

			80° and Dipping 85° towards N 64° (open penetrative joint along one of the runout chutes in the left flank). A shear band dipping 72° towards N 105°. Slide movement plane dipping 35° towards N 176°.
27	Landuse/ Landcover	:	Mixed cultivation (Rubber and coconut)
28	Hydrological condition	:	Wet
29	Triggering Factor	:	Heavy Rainfall
30	Death of persons	-	14 nos.
31	People affected	1:	4 nos.
32	Livestock Loss	:	S1116
33	Communication		Road and transmission line damaged. Electric polls and two transformers washed out.
34	Infrastructure	20	Five nos. of houses totally washed out and three houses partly damaged. One car damaged.
35	Agriculture/forest/Barren	:	Settlement area with cultivation
36	Geo-scientific Causes		Landslide initiated as planar failure at the contact between rock and overburden in the form of debris slide and then transformed into debris flow along four runout chutes. Unscientific hill slope modification resulted in the removal of toe support. Excessive rainfall is the triggering factor which resulted in the reduction of strength on saturation and increase in pore water pressure.
37	Remedial measures		The precarious boulders of different dimensions (Details of prominent precarious boulders are given in the note) present along the slide plane are to be removed immediately. Debris material along the naturally occurring nala on the right flank of the landslide has to be removed for the free flow of water.
38	Remarks, if any		Vertical rock cut observed below the crown area may have disturbed the toe which is inferred as one of the causative factors. The depression made by this rock cut to hold huge amount of water at that level which may have breached due to the impact of huge rock boulder transported from upslope augmented the intensity of the landslide. During this slide most of the debris material present on the hill slope has been washed out and the rock outcrop is exposed at several places. The threat of downward movement of the remaining disturbed material and the huge rock blocks are still there and it is advised to avoid habitations in this slope. The material and the rock blocks may be removed and it also suggested that a detailed geo-technical study of the distressed portion and adjacent area may be conducted prior to any construction or development work at this location.

39	Photos. Sketch of Plan & : section of the slide	
40	Summary/Abstract :	On 14th June 2018 a huge landslide occurred at Karinchola
41	2/2/2/14 CE07039	mala in Kattipara Panchayat resulted in the death of 14 people along with huge property loss. The landslide initiated as a planar failure and then transformed to debris flow along four runout chutes. The important geoscientific causes include unscientific hill slope modification that resulted in the removal of toe support. Excessive rainfall is the triggering factor which resulted in the reduction of strength on saturation and increase in pore water pressure. The depression made by the rock cut to hold huge amount of water below the crown level may have breached due to the impact of huge rock boulder transported from upslope augmented the intensity of the landslide. The immediate remedial measures include the removal of precarious boulders present along the slide plane and the remaining disturbed debris material. For further modification of the hill slope, a detailed geo-technical study of the distressed portion and adjacent area is recommended.
41	Date of Reporting :	29/06/2018
42	Landslide Category :	Category I

Slide-2:

No	Field		Description
1	Slide No.	1	KER/KKD/49M15/2018/02
2	State	10	Kerala
3	District	A	Kozhikode
4	Toposheet No.	4	49 M/15
5	Name of the slide	Y	Vettiozhinja Thottam Landslide
6	NH/SH/Locality	f.	Vettiozhinjathottam - Karinchola road
7	Latitude	••	11.4633
8	Longitude	••	75.9248
9	Length	••	50 m
10	Width	••	12 m
11	Height	:	20 m
12	Area	:	$600 m^2$

Denth		1.5 m
-	•	$900 m^3$
		55 m
		Debris Debris
* *	+ :	Slide
	<u> </u>	
	•	Very Rapid
	·	Active
	1	Retrogressive
	1 0	Single
	Æ	Shallow rotational ($\leq 5m$) failure
	:	14 th June 2018 (03:15 hrs)
Geomorphology		Lowly dissected slope. Landslide occurred in the southern
C 1 Will 1	- 5	flank of the hill and slide flow is towards N 180°.
	1.94	Highly weathered and fractured hornblende biotite gneiss.
	:	-
1 . 6 / 6 3	:	Cultivation (Rubber)
Hydrological condition	:	Dry. During rainy period spring appeared on slope
Triggering Factor	: ,	Heavy Rainfall
Death of persons	AS	Nil
People affected	-	4 nos.
Livestock Loss	3	Six goats dead
Communication	-8	Nil
Infrastructure	100	Two houses totally damaged. 10 cents of land affected.
Agriculture/forest/Barren	: "	Settlement area with rubber plantation
Geo-scientific Causes		Unscientific hill slope modification for construction of houses and plantation. Incessant rainfall resulted in reduction of strength on saturation and increase in pore water pressure.
Remedial measures		Construction of retaining wall with proper drainage out let. Natural flow of water along the hill slope should not be blocked.
Remarks, if any	3	
	5	
section of the slide	1	The second secon
	Death of persons People affected Livestock Loss Communication Infrastructure Agriculture/forest/Barren Geo-scientific Causes Remedial measures Remarks, if any Photos. Sketch of Plan &	Volume Runout distance : Type of Material : Type of movement : Rate of movement : Activity : Distribution : Style : Failure mechanism : History : Geomorphology : Geology/Lithology : Structure : Landuse/ Landcover : Hydrological condition : Triggering Factor : Death of persons People affected Livestock Loss Communication Infrastructure Agriculture/forest/Barren : Geo-scientific Causes : Remedial measures : Remarks, if any Photos. Sketch of Plan & :

40	Summary/Abstract	:	A debris flow has occurred on 14th June 2018 along the
			southern slope of the hill at Vettiozhinja thottam.
			Unscientific hill slope modification for construction of
			houses and plantation along with incessant rainfall resulted
			in the reduction of strength on saturation and increase in
			pore water pressure. Immediate remedial measures include
			construction of retaining wall with proper drainage outlet.
			Natural flow of water along the hill slope should not be
			blocked.
41	Date of Reporting	Ų	29/06/2018
42	Landslide Category	3	Category II

Slide-3:

No	Field		Description
1	Slide No.	4	KER/KKD/49M15/2018/03
2	State		Kerala
3	District	:	Kozhikode
4	Toposheet No.	:	49 M/15
5	Name of the slide	:	Kalvari Landslide
6	NH/SH/Locality	: ,	Kattipara - Chamal road
7	Latitude	. 3	11.4747
8	Longitude	:	75.9306
9	Length	:	80 m
10	Width	:	10 m
11	Height	1	60 m
12	Area	7)	$800 m^2$
13	Depth	€.	6 m
14	Volume	Jan.	$48000 m^3$
15	Runout distance	\cdot	130 m
16	Type of Material	de	Debris
17	Type of movement		Flow
18	Rate of movement	Z	Very Rapid
19	Activity	:	Active
20	Distribution		Confined
21	Style	/	Complex
22	Failure mechanism	Ź	Deep rotational (≥ 5m) failure
23	History	3	14 th June 2018 (04:30 hrs)
24	Geomorphology	1	Lowly dissected slope. Landslide occurred in the northern
			flank of the Karinchola mala and slide flow is towards N 20°.
25	Geology/Lithology		Weathered hornblende biotite gneiss.
26	Structure	Ħ	Foliation and foliation parallel joint dipping 70° towards N
		No. of Lot,	165°
27	Landuse/ Landcover	:	Mixed cultivation (Rubber and coconut at uphill side)
28	Hydrological condition	:	Wet
29	Triggering Factor	:	Heavy Rainfall
30	Death of persons	:	Nil
31	People affected	:	Nil
32	Livestock Loss	:	Nil

33	Communication	:	Nil
34	Infrastructure	:	Two houses totally and one house partially damaged. One pump house with tank damaged. About 4.5 acres agricultural
			land destroyed.
35	Agriculture/forest/Barren	:	Settlement area with cultivation
36	Geo-scientific Causes	:	Landslide initiated as deep rotational failure at the contact
			between rock and overburden in the form of debris slide and
			then transformed in to debris flow along two runout chutes.
			Excessive rainfall is the triggering factor which resulted in the reduction of strength on saturation and increase in pore
	1.50	/ '	water pressure.
37	Remedial measures		Precarious boulders present in the debris flown path may be
		0	safely removed. Natural drainage path has to be maintained
	1.	7	for avoiding water logged situation.
38	Remarks, if any		The slope forming material present near the crown area is
	145/00		soil and debris with a thickness of 0 to 0.5m and towards the
	115 / CT		downslope area it changes to soil, lithomarge and weathered
	1/12/2		rock with the thickness of the column increases up to 6m.
	145: 165	1	The distressed material flows through two runout chutes of which one is a tributary channel already present in the site.
39	Photos. Sketch of Plan &	1.8	which one is a tributary channel aready present in the site.
	section of the slide	W	
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	12-371	1	
		-	
40	Summary/Abstract	:	On 14th June 2018, a debris flow occurred on the northern
	J. 2 20002440		flank of Karinchola mala. The landslide initiated as deep
			flank of Karinchola mala. The landslide initiated as deep

			rotational failure at the contact between rock and overburden in the form of debris slide and then transformed
			in to debris flow along two runout chutes. Excessive rainfall is the triggering factor which resulted in the reduction of
			strength on saturation and increase in pore water pressure.
			Precarious boulders present in the debris flown path may be
			safely removed. Natural drainage path has to be maintained
			for avoiding water logged situation.
41	Date of Reporting	Ø	29/06/2018
42	Landslide Category		Category II

Slide-4:

Side No. Side No. Side No. Side No. State Serata Se		Silde-4:		
2 State : Kerala 3 District : Kozhikode 4 Toposheet No. : S8 A/3 5 Name of the slide : Kakkadampoyil Landslide 6 NH/SH/Locality : Kakkadampoyil - Nilambur road 7 Latitude : 11.3191 8 Longitude : 76.1109 9 Length : 70 m 10 Width : 18 m 11 Height : 25 m 12 Area : 1260 m² 13 Depth : 1.5 m 14 Volume : 1890 m³ 15 Runout distance : 45 m 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 planar (≤ 5m) failure 23 History : I A* June 2018 24 Geomorphology	No	Field		Description
3 District : Kozhikode 4 Toposheet No. : 58 A/3 5 Name of the slide : Kakkadampoyil Landslide 6 NH/SH/Locality : Kakkadampoyil - Nilambur road 7 Latitude : 11.3191 8 Longitude : 76.1109 9 Length : 70 m 10 Width : 18 m 11 Height : 25 m 12 Area : 1260 m² 13 Depth : 1.5 m 14 Volume : 1890 m³ 15 Runout distance : 45 m 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 planar (≤ 5m) failure 23 History : Lowly dissected slope. Landslide occurred in the s	1	Slide No.	:	KER/KKD/58A3/2018/04
4 Toposheet No. : 58 A/3 5 Name of the slide : Kakkadampoyil Landslide 6 NH/SH/Locality : Kakkadampoyil - Nilambur road 7 Latitude : 11,3191 8 Longitude : 76.1109 9 Length : 70 m 10 Width : 18 m 11 Height : 25 m 12 Area : 1260 m² 13 Depth : 1.5 m 14 Volume : 1890 m³ 15 Runout distance : 45 m 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 planar (≤5m) failure 13 History : 14th June 2018 4 Geomorphology : Lowly dissected slope. Landslide occurred in the southern flank of the hill and slide flow is towards N 215°. 26 Structure : Slide plane dipping 45° towards N 220°. 27 Landuse / Landcover : Mixed cultivation 28 Hydrological condition : Wet 29 Triggering Factor : Heavy Rainfall Death of persons : Nil 10 NH/SH/Locality : Nil 11 Nil 12 Nil 13 People affected : Nil 30 Communication : Nil	2	State		Kerala
5 Name of the slide : Kakkadampoyil Landslide 6 NH/SH/Locality : Kakkadampoyil - Nilambur road 7 Latitude : 11.3191 8 Longitude : 76.1109 9 Length : 70 m 10 Width : 18 m 11 Height : 25 m 12 Area : 1260 m² 13 Depth : 1.5 m 14 Volume : 1890 m³ 15 Runout distance : 45 m 16 Type of Material : Debris 17 Type of movement : Slide 18 Rate of movement : Rapid 19 Activity : Active 20 Distribution : Retrogressive Style : Single 22 Failure mechanism : Shallow planar (≤ 5m) failure 23 History : I 4th June 2018 24 Geomorphology : Lowly dissected slope. Landslide occurred in the southern flank of the hill and slide flow is towards N 215°. 25	3	District		Kozhikode
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8 Longitude : 76.1109 9 Length : 70 m 10 Width : 18 m 11 Height : 25 m 12 Area : 1260 m² 13 Depth : 1.5 m 14 Volume : 1890 m³ 15 Runout distance : 45 m 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 planar (≤5m) failure 23 History : I 44 ⁿ June 2018 24 Geomorphology : Lowly dissected slope. Landslide occurred in the southern flank of the hill and slide flow is towards N 215°. 25 Geology/Lithology : Granite gneiss. Weathered at places. 26 Structure : Slide plane dipping 45° towards N 220°. 27 Landuse / Landcover : Mixed cultivation 28 Hydrological condition	6	NH/SH/Locality	:	Kakkadampoyil - Nilambur road
9 Length : 70 m 10 Width : 18 m 11 Height : 25 m 12 Area : 1260 m² 13 Depth : 1.5 m 14 Volume : 1890 m³ 15 Runout distance : 45 m 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 planar (≤ 5m) failure 23 History : 14 ^m June 2018 24 Geomorphology : Lowly dissected slope. Landslide occurred in the southern flank of the hill and slide flow is towards N 215°. 25 Geology/Lithology : Granite gneiss. Weathered at places. 25 Structure : Slide plane dipping 45° towards N 220°. 27 Landuse / Landcover : Mixed cultivation 28 Hydrological cond	7	Latitude	:	
10 Width : 18 m 11 Height : 25 m 12 Area : 1260 m² 13 Depth : 1.5 m 14 Volume : 1890 m³ 15 Runout distance : 45 m 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 : Shide with June 2018 23 History : 14th June 2018 24 Geomorphology : Lowly dissected slope. Landslide occurred in the southern flank of the hill and slide flow is towards N 215°. 25 Geology/Lithology : Granite gneiss. Weathered at places. 26 Structure : Slide plane dipping 45° towards N 220°. 27 Landuse / Landcover : Mixed cultivation 28 Hydrological condition : Wet 29 Triggering Factor : Heavy Rainfall 30 Death of persons : Nil 31 People affected : Nil 32 Livestock Loss : Nil 33 Communication : Nil	8	Longitude	:	76.1109
11 Height : 25 m 12 Area : 1260 m² 13 Depth : 1.5 m 14 Volume : 1890 m³ 15 Runout distance : 45 m 16 Type of Material : Debris 17 Type of movement : Side 18 Rate of movement : Rapid 19 Activity : Active 20 Distribution : Retrogressive 21 Style : Single 22 Failure mechanism : Shallow planar (≤ 5m) failure 23 History : 14 th June 2018 24 Geomorphology : Lowly dissected slope. Landslide occurred in the southern flank of the hill and slide flow is towards N 215°. 25 Geology/Lithology : Granite gneiss. Weathered at places, 26 Structure : Slide plane dipping 45° towards N 220°. 27 Landuse / Landcover : Mixed cultivation 28 Hydrological condition : Wet 29 Triggering Factor : Heavy Rainfall 30 Death of persons : Nil 31 <	9	Length	:	70 m
12 Area : 1260 m² 13 Depth : 1.5 m 14 Volume : 1890 m³ 15 Runout distance : 45 m 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 planar (≤ 5m) failure 23 History : 14 th June 2018 24 Geomorphology : Lowly dissected slope. Landslide occurred in the southern flank of the hill and slide flow is towards N 215°. 25 Geology/Lithology : Granite gneiss. Weathered at places. 26 Structure : Slide plane dipping 45° towards N 220°. 27 Landuse / Landcover : Mixed cultivation 28 Hydrological condition : Wet 29 Triggering Factor : Heavy Rainfall 30 Death of persons : Nil 31 People affected : Nil 32 <td>10</td> <td>Width</td> <td>:</td> <td>X 1 K 1 L 2 C 2 C 2 C 2 C 2 C 2 C 2 C 2 C 2 C 2</td>	10	Width	:	X 1 K 1 L 2 C 2 C 2 C 2 C 2 C 2 C 2 C 2 C 2 C 2
13 Depth : 1.5 m 14 Volume : 1890 m³ 15 Runout distance : 45 m 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 planar (≤5m) failure 23 History : Jah June 2018 24 Geomorphology : Lowly dissected slope. Landslide occurred in the southern flank of the hill and slide flow is towards N 215°. 25 Geology/Lithology : Granite gneiss. Weathered at places. 26 Structure : Slide plane dipping 45° towards N 220°. 27 Landuse / Landcover : Mixed cultivation 28 Hydrological condition : Wet 29 Triggering Factor : Heavy Rainfall 30 Death of persons : Nil 31 People affected : Nil 32 Livestock Loss : Nil 33 </td <td>11</td> <td>Height</td> <td>:</td> <td></td>	11	Height	:	
14 Volume : 1890 m³ 15 Runout distance : 45 m 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 planar (≤ 5m) failure 23 History : 14th June 2018 24 Geomorphology : Lowly dissected slope. Landslide occurred in the southern flank of the hill and slide flow is towards N 215th	12	Area	1	$1260 m^2$
15 Runout distance : 45 m 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 planar (≤ 5m) failure 23 History : 14th June 2018 24 Geomorphology : Lowly dissected slope. Landslide occurred in the southern flank of the hill and slide flow is towards N 215°. 25 Geology/Lithology : Granite gneiss. Weathered at places. 26 Structure : Slide plane dipping 45° towards N 220°. 27 Landuse / Landcover : Mixed cultivation 28 Hydrological condition : Wet 29 Triggering Factor : Heavy Rainfall 30 Death of persons : Nil 31 People affected : Nil 32 Livestock Loss : Nil 33 Communication : Nil	13	Depth	7)	
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 planar (≤ 5m) failure 23 History : 14th June 2018 24 Geomorphology : Lowly dissected slope. Landslide occurred in the southern flank of the hill and slide flow is towards N 215°. 25 Geology/Lithology : Granite gneiss. Weathered at places. 26 Structure : Slide plane dipping 45° towards N 220°. 27 Landuse / Landcover : Mixed cultivation 28 Hydrological condition : Wet 29 Triggering Factor : Heavy Rainfall 30 Death of persons : Nil 31 People affected : Nil 32 Livestock Loss : Nil 33 Communication : Nil	14	Volume	K.	$1890 m^3$
17 Type of movement : Slide 18 Rate of movement : Rapid 19 Activity : Active 20 Distribution : Retrogressive 21 Style : Single 22 Failure mechanism : Shallow planar (≤5m) failure 23 History : 14th June 2018 24 Geomorphology : Lowly dissected slope. Landslide occurred in the southern flank of the hill and slide flow is towards N 215°. 25 Geology/Lithology : Granite gneiss. Weathered at places. 26 Structure : Slide plane dipping 45° towards N 220°. 27 Landuse / Landcover : Mixed cultivation 28 Hydrological condition : Wet 29 Triggering Factor : Heavy Rainfall 30 Death of persons : Nil 31 People affected : Nil 32 Livestock Loss : Nil 33 Communication : Nil	15	Runout distance	100	45 m
18 Rate of movement : Rapid 19 Activity : Active 20 Distribution : Retrogressive 21 Style : Single 22 Failure mechanism : Shallow planar (≤ 5m) failure 23 History : I4th June 2018 24 Geomorphology : Lowly dissected slope. Landslide occurred in the southern flank of the hill and slide flow is towards N 215°. 25 Geology/Lithology : Granite gneiss. Weathered at places. 26 Structure : Slide plane dipping 45° towards N 220°. 27 Landuse / Landcover : Mixed cultivation 28 Hydrological condition : Wet 29 Triggering Factor : Heavy Rainfall 30 Death of persons : Nil 31 People affected : Nil 32 Livestock Loss : Nil 33 Communication : Nil	16	Type of Material		Debris
19 Activity : Active 20 Distribution : Retrogressive 21 Style : Single 22 Failure mechanism : Shallow planar (≤ 5m) failure 23 History : 14 th June 2018 24 Geomorphology : Lowly dissected slope. Landslide occurred in the southern flank of the hill and slide flow is towards N 215°. 25 Geology/Lithology : Granite gneiss. Weathered at places. 26 Structure : Slide plane dipping 45° towards N 220°. 27 Landuse / Landcover : Mixed cultivation 28 Hydrological condition : Wet 29 Triggering Factor : Heavy Rainfall 30 Death of persons : Nil 31 People affected : Nil 32 Livestock Loss : Nil 33 Communication : Nil	17	Type of movement	1	Slide
20 Distribution : Retrogressive 21 Style : Single 22 Failure mechanism : Shallow planar (≤ 5m) failure 23 History : I4th June 2018 24 Geomorphology : Lowly dissected slope. Landslide occurred in the southern flank of the hill and slide flow is towards N 215°. 25 Geology/Lithology : Granite gneiss. Weathered at places. 26 Structure : Slide plane dipping 45° towards N 220°. 27 Landuse / Landcover : Mixed cultivation 28 Hydrological condition : Wet 29 Triggering Factor : Heavy Rainfall 30 Death of persons : Nil 31 People affected : Nil 32 Livestock Loss : Nil 33 Communication : Nil	18	Rate of movement	į.	Rapid
21 Style : Single 22 Failure mechanism : Shallow planar (≤5m) failure 23 History : 14th June 2018 24 Geomorphology : Lowly dissected slope. Landslide occurred in the southern flank of the hill and slide flow is towards N 215th. 25 Geology/Lithology : Granite gneiss. Weathered at places. 26 Structure : Slide plane dipping 45th towards N 220th. 27 Landuse / Landcover : Mixed cultivation 28 Hydrological condition : Wet 29 Triggering Factor : Heavy Rainfall 30 Death of persons : Nil 31 People affected : Nil 32 Livestock Loss : Nil 33 Communication : Nil	19	Activity	-7	Active
22 Failure mechanism : Shallow planar (≤ 5m) failure 23 History : 14th June 2018 24 Geomorphology : Lowly dissected slope. Landslide occurred in the southern flank of the hill and slide flow is towards N 215°. 25 Geology/Lithology : Granite gneiss. Weathered at places. 26 Structure : Slide plane dipping 45° towards N 220°. 27 Landuse / Landcover : Mixed cultivation 28 Hydrological condition : Wet 29 Triggering Factor : Heavy Rainfall 30 Death of persons : Nil 31 People affected : Nil 32 Livestock Loss : Nil 33 Communication : Nil	20	Distribution	:	Retrogressive
History : 14th June 2018 Geomorphology : Lowly dissected slope. Landslide occurred in the southern flank of the hill and slide flow is towards N 215°. Geology/Lithology : Granite gneiss. Weathered at places. Structure : Slide plane dipping 45° towards N 220°. Landuse / Landcover : Mixed cultivation Hydrological condition : Wet Triggering Factor : Heavy Rainfall Death of persons : Nil People affected : Nil Livestock Loss : Nil Communication : Nil	21	Style	:	Single
Geomorphology Cowly dissected slope. Landslide occurred in the southern flank of the hill and slide flow is towards N 215°.	22	Failure mechanism	/	Shallow planar (≤ 5m) failure
flank of the hill and slide flow is towards N 215°. 25 Geology/Lithology : Granite gneiss. Weathered at places. 26 Structure : Slide plane dipping 45° towards N 220°. 27 Landuse / Landcover : Mixed cultivation 28 Hydrological condition : Wet 29 Triggering Factor : Heavy Rainfall 30 Death of persons : Nil 31 People affected : Nil 32 Livestock Loss : Nil 33 Communication : Nil	23	History	Ť	14 th June 2018
25 Geology/Lithology : Granite gneiss. Weathered at places. 26 Structure : Slide plane dipping 45° towards N 220°. 27 Landuse / Landcover : Mixed cultivation 28 Hydrological condition : Wet 29 Triggering Factor : Heavy Rainfall 30 Death of persons : Nil 31 People affected : Nil 32 Livestock Loss : Nil 33 Communication : Nil	24	Geomorphology	1	Lowly dissected slope. Landslide occurred in the southern
26Structure: Slide plane dipping 45° towards N 220°.27Landuse / Landcover: Mixed cultivation28Hydrological condition: Wet29Triggering Factor: Heavy Rainfall30Death of persons: Nil31People affected: Nil32Livestock Loss: Nil33Communication: Nil			12	flank of the hill and slide flow is towards N 215°.
27Landuse / Landcover: Mixed cultivation28Hydrological condition: Wet29Triggering Factor: Heavy Rainfall30Death of persons: Nil31People affected: Nil32Livestock Loss: Nil33Communication: Nil	25	Geology/Lithology		Granite gneiss. Weathered at places.
28Hydrological condition: Wet29Triggering Factor: Heavy Rainfall30Death of persons: Nil31People affected: Nil32Livestock Loss: Nil33Communication: Nil	26	Structure		Slide plane dipping 45° towards N 220°.
29Triggering Factor: Heavy Rainfall30Death of persons: Nil31People affected: Nil32Livestock Loss: Nil33Communication: Nil	27	Landuse / Landcover	T	Mixed cultivation
30Death of persons:Nil31People affected:Nil32Livestock Loss:Nil33Communication:Nil	28	Hydrological condition	-	Wet
30Death of persons:Nil31People affected:Nil32Livestock Loss:Nil33Communication:Nil	29	Triggering Factor	:	Heavy Rainfall
32 Livestock Loss : Nil 33 Communication : Nil			:	Nil
32 Livestock Loss : Nil 33 Communication : Nil	31	People affected	:	Nil
33 Communication : Nil			:	
			:	Nil
			:	

35	Agriculture/forest/Barren	:	Cultivated land destroyed
36	Geo-scientific Causes Remedial measures	:	Landslide occurred as planar failure at the contact between rock and overburden in the form of debris slide. Unscientific hill slope modification resulted in the removal of toe support. Excessive rainfall is the triggering factor which resulted in the reduction of strength on saturation and increase in pore water pressure. Proper retaining structures with drain holes have to be
		- 1	provided.
38	Remarks, if any	(0)	On the right flank of the slide one tributary nala (natural) is present. At the toe portion, a pond and well with pump house is seen. At the crown area, the overburden thickness is 0 to 0.5 m and towards downslope it increases to 0.5 to 5 m. A water theme park is present on the top portion of the hill (saddle area).
39	Photos, Sketch of Plan & section of the slide	ACCOUNT ACCOUNTS	
40	Summary/Abstract		A debris slide occurred on 14 th June 2018 downhill side of the water theme park located at Kakkadampoyil. The landslide occurred as planar failure at the contact between rock and overburden in the form of debris slide. Unscientific hill slope modification resulted in the removal of toe support. Excessive rainfall is the triggering factor which resulted in the reduction of strength on saturation and increase in pore water pressure. The overburden thickness varies from 0 to 0.5 m at top and towards downslope it increases to 0.5 to 5 m. Proper retaining structures with drain holes has to be provided.
41	Date of Reporting		01/07/2018
42	Landslide Category	:	Category III
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Slide-5:

No	Field		Description
1	Slide No.	:	KER/KKD/58A3/2018/05
2	State	:	Kerala

3	District	:	Kozhikode
4	Toposheet No.	:	58 A/3
5	Name of the slide	:	Kooderanji Landslide
6	NH/SH/Locality	:	Kooderanji - Kakkadampoyil road
7	Latitude	:	11.3221
8	Longitude	:	76.0883
9	Length	:	40 m
10	Width	100	8 m
11	Height	-5	25 m
12	Area	1	$320 m^2$
13	Depth		1 m
14	Volume	-	$320 m^3$
15	Runout distance	and the same	Up to the road bench level
16	Type of Material	:	Debris
17	Type of movement	J.	Flow
18	Rate of movement	:	Rapid
19	Activity	:	Active
20	Distribution	:	Confined
21	Style	:	Complex
22	Failure mechanism	: 17	Shallow rotational (≤ 5m) failure
23	History	:	14 th June 2018
24	Geomorphology	:	Lowly dissected slope. Debris flow direction is towards N 20°. Upslope is steeply sloping (escarpment) and downslope is having moderate slope
25	Geology/Lithology	Δ.	Weathered gneiss
26	Structure	7)	
27	Landuse/ Landcover	(Mixed vegetation
28	Hydrological condition	100	Dry
29	Triggering Factor	Ŕ.	Heavy Rainfall
30	Death of persons	7.	Nil
31	People affected	1	Nil
32	Livestock Loss	- 6	Nil
33	Communication	:	Kooderanji – Kakkadampoyil road blocked
2.4			
34	Infrastructure	10	Nil
35		<	
	Infrastructure Agriculture/forest/Barren Geo-scientific Causes	1	Mixed vegetation area damaged
35	Agriculture/forest/Barren	1	
35	Agriculture/forest/Barren	1	Mixed vegetation area damaged Landslide initiated as rotational failure at the contact between rock and overburden in the form of debris slide and then transformed in to debris flow along the pre-existing nala path. Excessive rainfall is the triggering factor which resulted in the reduction of strength on saturation and increase in

39	Photos. Sketch of Plan & section of the slide		
40	Summary/Abstract		A debris flow occurred on 14 th June 2018 at Kooderanji. Landslide initiated as debris slide and then transformed in to debris flow along the pre-existing nala path. Excessive rainfall is the triggering factor which resulted in the reduction of strength on saturation and increase in pore water pressure. Precarious boulders along the debris flow path have to be removed. The natural flow should not be blocked along the nala.
41	Date of Reporting	: 1	01/07/2018
42	Landslide Category	:	Category III

72	Landshuc Category	•	Cutegory III	
Sl	Slide-6:			
No	Field		Description	
1	Slide No.	34	KER/KKD/58A3/2018/06	
2	State		Kerala	
3	District	Ď,	Kozhikode	
4	Toposheet No.	7	58 A/3	
5	Name of the slide	4.	Muthappanpuzha Landslide	
6	NH/SH/Locality	1	Anakkampoyil – Karimbu - Poomarathumkolli road	
7	Latitude	:	11.4302	
8	Longitude	:	76.0854	
9	Length	10	20 m	
10	Width	1	8 m	
11	Height	X	16 m	
12	Area	-	$160 m^2$	
13	Depth		1 m	
14	Volume	:	$160 m^3$	
15	Runout distance	:	180 m	
16	Type of Material	:	Debris cum rock	
17	Type of movement	:	Flow	
18	Rate of movement	:	Rapid	
19	Activity	:	Active	
20	Distribution	:	Confined	

21	Style	:	Complex
22	Failure mechanism	:	Shallow rotational $(\leq 5m)$ failure
23	History	:	13 th June 2018 (17:00 hrs)
24	Geomorphology	:	Lowly dissected slope. Debris flow towards N 340°
25	Geology/Lithology	:	Charnockite gneiss. Gneissic bands at places.
26	Structure	:	-
27	Landuse/ Landcover	:	Mixed vegetation
28	Hydrological condition		Dry
29	Triggering Factor	5	Heavy Rainfall
30	Death of persons		Nil
31	People affected	4	Nil
32	Livestock Loss	-	Nil
33	Communication		Road damaged
34	Infrastructure	:	Nil
35	Agriculture/forest/Barren	į.	Arecanut plantation in 0.5 acre affected
36	Geo-scientific Causes		Landslide initiated as debris slide and then transformed in to
			debris flow. Incessant rainfall is the triggering factor which
	1/12/12		resulted in the reduction of strength on saturation and
	145 /22		increase in pore water pressure.
37	Remedial measures	: 1	Precarious boulders along the debris flow path have to be
	16/10		removed. Ensure free flow of water along the hill slopes.
38	Remarks, if any		
39	Photos. Sketch of Plan &	:	
	section of the slide		
		4	
		7)	
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			A STATE OF THE STA
40	Summary/Abstract		On 13th June 2018 a debris-cum-rock flow occurred at
10	Sammar J/110bitable	<u>. </u>	on to onic 2010 a acomo cum rock from occurred at

			Muthappanpuzha. This landslide initiated as debris slide and then transformed in to debris flow. Incessant rainfall is the triggering factor which resulted in the reduction of strength on saturation and increase in pore water pressure. The immediate remedial measures include removal of precarious boulders along the debris flow path and to ensure free flow of water along the hill slopes.
41	Date of Reporting		01/07/2018
42	Landslide Category	1	Category III

Slide-7:

Silde-/:	
No Field Description	
1 Slide No. : KER/KKD/58A3/2018/07	×
2 State : Kerala	
3 District : Kozhikode	
4 Toposheet No. : 58 A/3	
5 Name of the slide : Karimbu Landslide	
6 NH/SH/Locality : Anakkampoyil –Poomarathumkolli roa	d
7 Latitude : 11.4335	10
8 Longitude : 76.0802	
9 Length : 45 m	39.1
10 Width : 7 m	
11 Height : 30 m	
12 Area : $315 m^2$	
13 Depth : 1 m	
14 Volume : 315 m ³	,
15 Runout distance : Upto the road bench	
16 Type of Material : Debris	
17 Type of movement : Flow	
18 Rate of movement : Rapid	
19 Activity : Active	
20 Distribution : Retrogressive	/
21 Style : Complex	/
Failure mechanism : Shallow rotational ($\leq 5m$) failure	/
23 History : 14 th June 2018 (17:30 hrs)	
24 Geomorphology : Lowly dissected slope. Debris flow tow	ards N 350°
25 Geology/Lithology : Weathered charnockite gneiss	
26 Structure : Movement plane dipping 34° towards N	V 350°
27 Landuse/ Landcover : Mixed cultivation	
28 Hydrological condition : Wet	
29 Triggering Factor : Heavy Rainfall	
30 Death of persons : <i>Nil</i>	
31 People affected : Nil	
32 Livestock Loss : Nil	
33 Communication : Nil	
34 Infrastructure : 15 cents land damaged	
13 cems tana damagea	

36	Geo-scientific Causes	:	Landslide initiated as planar failure at the contact between rock and overburden in the form of debris slide and then transformed in to debris flow. Excessive rainfall is the triggering factor which resulted in the reduction of strength on saturation and increase in pore water pressure.
37	Remedial measures		Three huge precarious boulders seem to occupy on the crown area and which is advised to be removed/treated. Proper retaining wall with drain holes at the cut slope may be provided.
38	Remarks, if any		F 22 1 1 1 2 2 2
39	Photos. Sketch of Plan & section of the slide		
40	Summary/Abstract	グノング	A debris flow occurred at Karimbu on 14 th June 2018. Landslide initiated as planar failure at the contact between rock and overburden in the form of debris slide and then transformed in to debris flow. Excessive rainfall is the triggering factor which resulted in the reduction of strength on saturation and increase in pore water pressure. At the crown area, three huge precarious boulders seem to occupy and which is advised to be removed/treated. Proper retaining wall with drain holes at the cut slope may be provided.
41	Date of Reporting	: ,,	01/07/2018
42	Landslide Category	(Category II

Slide-8:

No	Field		Description
1	Slide No.	T	KER/KKD/58A3/2018/08
2	State	Y,	Kerala
3	District		Kozhikode
4	Toposheet No.	:	58 A/3
5	Name of the slide	:	Melemuthappanpuzha - 1 Landslide
6	NH/SH/Locality	:	Melemuthappanpuzha road
7	Latitude	:	11.4404
8	Longitude	:	76.0889
9	Length	:	12 m

10	Width		15 m
11	Height		10 m
12	Area		180 m^2
13	Depth		0.8 m
14	Volume		$144 m^3$
15	Runout distance		140 m (upto the nala below)
16	Type of Material	:	Debris
17	Type of Material Type of movement	÷	Slide
	Rate of movement		
18		Ε,	Rapid
19	Activity	į.	Active
20	Distribution		Retrogressive
21	Style		Single
22	Failure mechanism	16,	Shallow rotational ($\leq 5m$) failure
23	History	:%	12 th June 2018 (17:30 hrs)
24	Geomorphology	:	Lowly dissected slope. Debris material flown towards N 255° upto the nala downslope.
25	Geology/Lithology	:	Charnockite. Gneissic at places.
26	Structure	:	- prv4-1
27	Landuse/ Landcover	B	Mixed cultivation
28	Hydrological condition	5	Dry
29	Triggering Factor	S	Heavy Rainfall
30	Death of persons	:8	Nil
31	People affected	8	Nil
32	Livestock Loss	:	20 nos. poultry dead
33	Communication	:	Melemuthappanpuzha road blocked
34	Infrastructure	:	One shed damaged
35	Agriculture/forest/Barren	-6	Mixed plantation affected
36	Geo-scientific Causes	7	Unscientific slope modification and unprotected cut slope
7	1 1	10	made for road construction. Incessant rainfall is the
	1 1	4	triggering factor which resulted in the reduction of strength
		Maria Contract	on saturation and increase in pore water pressure.
37	Remedial measures	H	Retaining wall with proper drainage outlets
38	Remarks, if any	7	Another cut slope failure noticed behind the nearby house
	1/1/1/1	part ,	located above this landslide
39	Photos. Sketch of Plan &	1	
	section of the slide		
	11.5011195		
	15 miles		
	112-37310	10	
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	i.		

40	Summary/Abstract	:	On 12 th June 2018, a debris slide occurred at
			melemuthappanpuzha. Geoscientific causes include unscientific slope modification and unprotected cut slope made for road construction. Incessant rainfall is the triggering factor which resulted in the reduction of strength
			on saturation and increase in pore water pressure. Retaining
			wall with proper drainage outlets has to be provided.
41	Date of Reporting		01/07/2018
42	Landslide Category	13	Category II

42	Landslide Category		Category II		
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	Slide-9:	W			
No	Field		Description		
1	Slide No.	and the same	KER/KKD/58A3/2018/09		
2	State	:	Kerala		
3	District	J.	Kozhikode		
4	Toposheet No.	:	58 A/3		
5	Name of the slide	:	Melemuthappanpuzha - 2 Landslide		
6	NH/SH/Locality	:	Melemuthappanpuzha road		
7	Latitude	:	11.4390		
8	Longitude	:	76.0881		
9	Length	:	6 m		
10	Width	:	12 m		
11	Height	:	5 m		
12	Area	:	$72 m^2$		
13	Depth	Δ.	1 m		
14	Volume	7)	$72 m^3$		
15	Runout distance	K.	- de Kill fallet Die er		
16	Type of Material	Jan.	Soil		
17	Type of movement	į.	Slide		
18	Rate of movement	1	Very rapid		
19	Activity		Active		
20	Distribution	- 7,	Retrogressive		
21	Style	:	Single		
22	Failure mechanism	:	Shallow rotational (≤ 5m) failure		
23	History	1	12 th June 2018 (18:00 hrs)		
24	Geomorphology	7	Lowly dissected slope		
25	Geology/Lithology		Charnockite. Gneissic at places		
26	Structure	1. 30			
27	Landuse/ Landcover	1	Mixed cultivation		
28	Hydrological condition		Wet		
29	Triggering Factor	-	Heavy Rainfall		
30	Death of persons		Nil		
31	People affected	:	Nil		
32	Livestock Loss	:	Nil		
33	Communication	:	Nil		
34	Infrastructure	:	20 cents land damaged		
35	Agriculture/forest/Barren	:	Mixed plantation affected		
36	Geo-scientific Causes	:	Unscientific slope modification and unprotected cut slope		
		· -	1		

			made for house construction. Incessant rainfall is the
			triggering factor which resulted in the reduction of strength
			on saturation and increase in pore water pressure.
37	Remedial measures		Retaining wall with proper drain holes. Easing of the slope.
		•	Relating wait with proper arath notes. Easing of the stope.
38	Remarks, if any		-
39	Photos. Sketch of Plan &	:	
	section of the slide		《 第 1 图 1 图 2 图 2 图 2 图 2 图 2 图 2 图 2 图 2 图
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40	Summary/Abstract		A debris slide occurred on 12 th June 2018 at
	10/0	1	Muthappanpuzha. The important causes include unscientific
	the lead	- 1/2	slope modification and unprotected cut slope made for house
ľ		1	construction. Incessant rainfall is the triggering factor which
	TU		resulted in the reduction of strength on saturation and
	H in A		increase in pore water pressure. Important remedial
1		_	measures include providing retaining wall with proper drain
1			holes and easing of the slope.
41	Date of Reporting	AN	01/07/2018
42	Landslide Category	12	Category II

Slide-10:

No	Field	100	Description
1	Slide No.	<i>.</i> /	KER/KKD/58A3/2018/10
2	State	:	Kerala
3	District	:	Kozhikode
4	Toposheet No.	1	58 A/3
5	Name of the slide	E	Maripuzha -1 Landslide
6	NH/SH/Locality	A	Maripuzha road
7	Latitude	11	11.4475
8	Longitude	ы	76.0959
9	Length	:	25 m
10	Width	:	18 m
11	Height	:	20 m
12	Area	:	$450 m^2$
13	Depth	:	2 m
14	Volume	:	$900 m^3$
15	Runout distance	:	-

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 rotational ($\leq 5m$) failure
23	History		12 th June 2018
24	Geomorphology		Lowly dissected slope. Debris material flown towards N 10° upto the nala downslope
25	Geology/Lithology	W	Charnockite gneiss
26	Structure	-	
27	Landuse/ Landcover	and the same	Mixed cultivation
28	Hydrological condition	:	Dry
29	Triggering Factor	į.	Heavy Rainfall
30	Death of persons	:	Nil
31	People affected		Nil
32	Livestock Loss	:	Nil
33	Communication	:	Nil
34	Infrastructure	•	Nil
35	Agriculture/forest/Barren	:	Agricultural land damaged
36	Geo-scientific Causes	:	Removal of toe due to the flow of water in the nala at the
37	Remedial measures	4	downslope. Incessant rainfall is the triggering factor which resulted in the reduction of strength on saturation and increase in pore water pressure. Retaining structure with proper weep holes has to be provided
38	Remarks, if any	10	provided
39	Photos. Sketch of Plan & section of the slide		
40	Summary/Abstract	:	A debris slide occurred near maripuzha on 12 th June 2018. The main causes include removal of toe due to the flow of water in the nala at the downslope. Incessant rainfall is the triggering factor which resulted in the reduction of strength on saturation and increase in pore water pressure. Retaining wall with proper weep holes has to be provided.

41	Date of Reporting	:	01/07/2018
42	Landslide Category	:	Category III

Slide-11:

No	Field		Description
1	Slide No.	:	KER/KKD/58A3/2018/11
2	State		Kerala
3	District	e: 1	Kozhikode
4	Toposheet No.	. 1	58 A/3
5	Name of the slide	9.	Maripuzha -2 Landslide
6	NH/SH/Locality	-	Anakkampoyil – Kalladi - Meppadi road
7	Latitude	:0	11.4492
8	Longitude	190	76.1014
9	Length	:	32 m
10	Width	:	30 m
11	Height	:	22 m
12	Area	:	$960 m^2$
13	Depth	20	7 m
14	Volume		6720 m^3
15	Runout distance	(X	
16	Type of Material	Ţ,	Debris
17	Type of movement	- XX	Slide
18	Rate of movement		Rapid
19	Activity	:	Active
20	Distribution	:	Retrogressive
21	Style	4	Single
22	Failure mechanism	10	Deep rotational (≥ 5m) failure
23	History	48	12 th June 2018
24	Geomorphology	4	Lowly dissected slope. Debris material flown towards N 250°
		and have	upto the river.
25	Geology/Lithology	B	Gneiss
26	Structure	>	3.20 Yes
27	Landuse/ Landcover		Mixed cultivation
28	Hydrological condition	/	Wet
29	Triggering Factor	:	Heavy Rainfall
30	Death of persons	:	Nil
31	People affected		Nil
32	Livestock Loss	1/	Nil
33	Communication		Nil
34	Infrastructure	-	Nil
35	Agriculture/forest/Barren		Agricultural land damaged
36	Geo-scientific Causes	:	Removal of toe support due to river bank erosion. Incessant
			rainfall is the triggering factor which resulted in the
			reduction of strength on saturation and increase in pore
			water pressure.
37	Remedial measures	:	Provide retaining structures/river bank protection structures
			with proper drainage holes.

38	Remarks, if any		-
39	Photos. Sketch of Plan &	:	
	section of the slide		
40	Summary/Abstract	p.	On 12 th June 2018 a debris slide occurred at Maripuzha. Important causes include removal of toe support due to river bank erosion. Incessant rainfall is the triggering factor which resulted in the reduction of strength on saturation and increase in pore water pressure. It is to provide retaining structures / river bank protection structures with proper drainage holes.
41	Date of Reporting	:	01/07/2018
42	Landslide Category	:	Category III
	Slide-12:	7	

No	Field		Description
1	Slide No.	٠.	KER/KKD/49M15/2018/12
2	State	1	Kerala
3	District	-7	Kozhikode
4	Toposheet No.	Á	49 M/15
	1	7.	
5	Name of the slide	7	Kurumpoyil Landslide
6	NH/SH/Locality	14	Kurumpoyil - Vayalada road
7	Latitude	:	11.4978
8	Longitude	• •	75.8647
9	Length	1	20 m
10	Width	7	6 m
11	Height	j.	42 m
12	Area	11/4	$120 m^2$
13	Depth		1 m
14	Volume		$120 m^3$
15	Runout distance		50 m
16	Type of Material	Ē.	Debris
17	Type of movement	:	Flow
18	Rate of movement	:	Very rapid
19	Activity	••	Active
20	Distribution	:	Confined
21	Style	:	Complex
22	Failure mechanism	:	Shallow planar ($\leq 5m$) failure
23	History		14 th June 2018

24 Geomorphology : Lowly dissected slope. 25 Geology/Lithology : Gneissic charnockite 26 Structure : - 27 Landuse/ Landcover : Rubber plantation 28 Hydrological condition : Dry 29 Triggering Factor : Heavy Rainfall 30 Death of persons : Nil 31 People affected : Nil 32 Livestock Loss : Nil 33 Communication : Nil 34 Infrastructure : Nil 35 Agriculture/forest/Barren : Agricultural land damaged 36 Geo-scientific Causes : Landslide initiated as planar failure at the contact rock and overburden in the form of debris slide transformed in to debris flow. Excessive rainfort triggering factor which resulted in the reduction of the one of the property of th	and then
26 Structure : -	and then
27 Landuse/ Landcover : Rubber plantation 28 Hydrological condition : Dry 29 Triggering Factor : Heavy Rainfall 30 Death of persons : Nil	and then
Triggering Factor	and then
Triggering Factor	and then
30 Death of persons : Nil	and then
31 People affected : Nil	and then
32 Livestock Loss : Nil	and then
34	and then
35 Agriculture/forest/Barren : Agricultural land damaged	and then
36 Geo-scientific Causes : Landslide initiated as planar failure at the contact rock and overburden in the form of debris slide transformed in to debris flow. Excessive rainfattriggering factor which resulted in the reduction of on saturation and increase in pore water pressure. 37 Remedial measures : Unscientific hill slope modification has to avoided 38 Remarks, if any -	and then
rock and overburden in the form of debris slide transformed in to debris flow. Excessive rainfa triggering factor which resulted in the reduction of on saturation and increase in pore water pressure. Remedial measures Unscientific hill slope modification has to avoided Remarks, if any	and then
rock and overburden in the form of debris slide transformed in to debris flow. Excessive rainfa triggering factor which resulted in the reduction o on saturation and increase in pore water pressure. Remedial measures Unscientific hill slope modification has to avoided Remarks, if any	and then
transformed in to debris flow. Excessive rainfal triggering factor which resulted in the reduction of on saturation and increase in pore water pressure. 37 Remedial measures : Unscientific hill slope modification has to avoided 38 Remarks, if any -	
on saturation and increase in pore water pressure. Remedial measures : Unscientific hill slope modification has to avoided Remarks, if any -	
37 Remedial measures : Unscientific hill slope modification has to avoided 38 Remarks, if any -	^c strength
38 Remarks, if any	
39 Photos. Sketch of Plan & :	
section of the slide	
	A CONTRACTOR
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	1
40 Summary/Abstract : On 14 th June 2018 a debris flow was occurred at Ku	rumpoyil.
This landslide initiated as planar failure at the	
between rock and overburden in the form of debris	
then transformed in to debris flow. Excessive rain,	
triggering factor which resulted in the reduction o	
on saturation and increase in pore water	
Unscientific hill slope modification has to avoided.	1
41 Date of Reporting : 02/07/2018	
42 Landslide Category : Category III	

Slide-13:

No	Field		Description
1	Slide No.	:	KER/KKD/49M14/2018/13
2	State	:	Kerala
3	District		Kozhikode

5 Name of the slide : Thalayad Landslide 6 NH/SH/Locality : Thalayad - Vayalada road 7 Latitude : 11.5076 8 Longitude : 75.8817 9 Length : 14 m 10 Width : 18 m 11 Height : 12 m 12 Area : 252 m² 13 Depth : 1.5 m 14 Volume : 378 m³ 15 Runout distance : - 16 Type of Material : Debris 17 Type of movement : Slide 18 Rate of movement : Rapid 19 Activity : Active 20 Distribution : Retrogressive Style : Single 21 Style : Single 22 Failure mechanism : Shaftow rotational (≤ 5m) failure 23 History : Lowly dissected slope. Debris material flown towards N 330° 24 Geomorphology : Lowly dissected slope. Debris material flown towards N 330° 25 Geology/Lithology :	4	Toposheet No.	:	49 M/14
Total Company Total Compa	5		:	Thalayad Landslide
Total Company Total Compa	6	NH/SH/Locality	:	Thalayad - Vayalada road
9	7	Latitude	:	11.5076
10 Width	8	Longitude	:	75.8817
11 Height : 12 m 12 Area : 252 m² 13 Depth : 1.5 m 14 Volume : 378 m³ 15 Runout distance : . 16 Type of Material : Debris 17 Type of movement : Side 18 Rate of movement : Rapid 19 Activity : Active 20 Distribution : Retrogressive 21 Style : Single 22 Failure mechanism : Shallow rotational (≤5m) failure 23 History : 14 th June 2018 24 Geomorphology : Lowly dissected slope. Debris material flown towards N 330° 25 Geology/Lithology : Weathered charnockite 26 Structure : - 27 Landuse/ Landcover : Mixed cultivation 28 Hydrological condition : Dry 29 Triggering Factor : Heavy Rainfall 30 Death of persons : Nil 31 People affected : Nil 32 Livestock Loss	9	Length	:	14 m
12 Area	10	Width	:	18 m
13 Depth	11	Height	1	12 m
14 Volume : 378 m³ 15 Runout distance : Debris 17 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 rotational (≤ 5m) failure 23 History : 14 th June 2018 24 Geomorphology : Lowly dissected slope. Debris material flown towards N 330° 25 Geology/Lithology : Weathered charnockite 26 Structure : - 27 Landuse/ Landcover : Mixed cultivation 28 Hydrological condition : Dry 29 Triggering Factor : Heavy Rainfall 30 Death of persons : Nil 31 People affected : Nil 32 Livestock Loss : Nil 33 Communication : Thalayad Vayalada road damaged 34 Infrastructure : Nil <td>12</td> <td>Area</td> <td>ā</td> <td></td>	12	Area	ā	
15 Runout distance : Debris 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 rotational (≤ 5m) failure 23 History : 14 th June 2018 24 Geomorphology : Lowly dissected slope. Debris material flown towards N 330° 25 Geology/Lithology : Weathered charnockite 26 Structure : - 27 Landuse/ Landcover : Mixed cultivation 28 Hydrological condition : Dry 29 Triggering Factor : Heavy Rainfall 30 Death of persons : Nil 31 People affected : Nil 32 Livestock Loss : Nil 33 Communication : Thalayad – Vayalada road damaged 34 Infrastructure : Nil 35 Agriculture/forest/Barren	13	Depth	1	1.5 m
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 rotational (≤ 5m) failure 23 History : 14th June 2018 24 Geomorphology : Lowly dissected slope. Debris material flown towards N 330th 10 structure 25 Geology/Lithology : Weathered charnockite 26 Structure : - 27 Landuse/ Landcover : Mixed cultivation 28 Hydrological condition : Dry 29 Triggering Factor : Heavy Rainfall 30 Death of persons : Nil 31 People affected : Nil 32 Livestock Loss : Nil 33 Communication : Thalayad - Vayalada road damaged 34 Infrastructure : Nil 35 Agriculture/forest/Barren : Agricultural land damaged 36	14	Volume	(Jan	$378 m^3$
17 Type of movement : Slide 18 Rate of movement : Rapid 19 Activity : Active 20 Distribution : Retrogressive 21 Style : Single 22 Failure mechanism : Shallow rotational (≤ 5m) failure 23 History : 14th June 2018 24 Geomorphology : Lowly dissected slope. Debris material flown towards N 330° 25 Geology/Lithology : Weathered charnockite 26 Structure : - 27 Landuse/ Landcover : Mixed cultivation 28 Hydrological condition : Dry 29 Triggering Factor : Heavy Rainfall 30 Death of persons : Nil 31 People affected : Nil 32 Livestock Loss : Nil 33 Communication : Thalayad - Vayalada road damaged 34 Infrastructure : Nil 35 Agriculture/forest/Barren : Agricultural land damaged 36 Geo-scientific Causes : Unscientific slope modification and unprotected cut slope made for road construction. Incessant rainfall is the triggering factor which resulted in the reduction of strength on saturation and increase in pore water pressure. 37 Remedial measures : Retaining wall with proper weep holes.	15	Runout distance	-	
18 Rate of movement : Rapid 19 Activity : Active 20 Distribution : Retrogressive 21 Style : Single 22 Failure mechanism : Shallow rotational (≤ 5m) failure 23 History : 14th June 2018 24 Geomorphology : Lowly dissected slope. Debris material flown towards N 330° 25 Geology/Lithology : Weathered charnockite 26 Structure : - 27 Landuse/ Landcover : Mixed cultivation 28 Hydrological condition : Dry 29 Triggering Factor : Heavy Rainfall 30 Death of persons : Nil 31 People affected : Nil 32 Livestock Loss : Nil 33 Communication : Thalayad - Vayalada road damaged 34 Infrastructure : Nil 35 Agriculture/forest/Barren : Agricultural land damaged 36 Geo-scientific Causes : Unscientific slope modification and unprotected cut slope made for road construction. Incessant rainfall is the triggering factor which resulted in the reductio	16			Debris
19 Activity : Active 20 Distribution : Retrogressive 21 Style : Single 22 Failure mechanism : Shallow rotational (≤ 5m) failure 23 History : 14 th June 2018 24 Geomorphology : Lowly dissected slope. Debris material flown towards N 330° 25 Geology/Lithology : Weathered charnockite 26 Structure : - 27 Landuse/ Landcover : Mixed cultivation 28 Hydrological condition : Dry 29 Triggering Factor : Heavy Rainfall 30 Death of persons : Nil 31 People affected : Nil 32 Livestock Loss : Nil 33 Communication : Thalayad - Vayalada road damaged 34 Infrastructure : Nil 35 Agriculture/forest/Barren : Agricultural land damaged 36 Geo-scientific Causes : Unscientific slope modification and unprotected cut slope made for road construction. Incessant rainfall is the triggering factor which resulted in the reduction of strength on saturation and increase in pore water pressure. 37 Remedial measures : Retaining wall with proper weep holes.	17		:	Slide
Style	18	Rate of movement	ji.	Rapid
21 Style : Single 22 Failure mechanism : Shallow rotational (≤ 5m) failure 23 History : 14 th June 2018 24 Geomorphology : Lowly dissected slope. Debris material flown towards N 330° 25 Geology/Lithology : Weathered charnockite 26 Structure : - 27 Landuse/ Landcover : Mixed cultivation 28 Hydrological condition : Dry 29 Triggering Factor : Heavy Rainfall 30 Death of persons : Nil 31 People affected : Nil 32 Livestock Loss : Nil 33 Communication : Thalayad - Vayalada road damaged 34 Infrastructure : Nil 35 Agriculture/forest/Barren : Agricultural land damaged 36 Geo-scientific Causes : Unscientific slope modification and unprotected cut slope made for road construction. Incessant rainfall is the triggering factor which resulted in the reduction of strength on saturation and increase in pore water pressure. 37 Remedial measures : Retaining wall with proper weep holes.	19		:	Active
22 Failure mechanism : Shallow rotational (≤ 5m) failure 23 History : 14 th June 2018 24 Geomorphology : Lowly dissected slope. Debris material flown towards N 330° 25 Geology/Lithology : Weathered charnockite 26 Structure : - 27 Landuse/ Landcover : Mixed cultivation 28 Hydrological condition : Dry 29 Triggering Factor : Heavy Rainfall 30 Death of persons : Nil 31 People affected : Nil 32 Livestock Loss : Nil 33 Communication : Thalayad - Vayalada road damaged 34 Infrastructure : Nil 35 Agriculture/forest/Barren : Agricultural land damaged 36 Geo-scientific Causes : Unscientific slope modification and unprotected cut slope made for road construction. Incessant rainfall is the triggering factor which resulted in the reduction of strength on saturation and increase in pore water pressure. 37 Remedial measures : Retaining wall with proper weep holes.	20	Distribution	:	Retrogressive
History			:	Single
24 Geomorphology : Lowly dissected slope. Debris material flown towards N 330° 25 Geology/Lithology : Weathered charnockite 26 Structure : - 27 Landuse/ Landcover : Mixed cultivation 28 Hydrological condition : Dry 29 Triggering Factor : Heavy Rainfall 30 Death of persons : Nil 31 People affected : Nil 32 Livestock Loss : Nil 33 Communication : Thalayad - Vayalada road damaged 34 Infrastructure : Nil 35 Agriculture/forest/Barren : Agricultural land damaged 36 Geo-scientific Causes : Unscientific slope modification and unprotected cut slope made for road construction. Incessant rainfall is the triggering factor which resulted in the reduction of strength on saturation and increase in pore water pressure. 37 Remedial measures : Retaining wall with proper weep holes.	22	Failure mechanism	:	
25 Geology/Lithology : Weathered charnockite 26 Structure : - 27 Landuse/ Landcover : Mixed cultivation 28 Hydrological condition : Dry 29 Triggering Factor : Heavy Rainfall 30 Death of persons : Nil 31 People affected : Nil 32 Livestock Loss : Nil 33 Communication : Thalayad – Vayalada road damaged 34 Infrastructure : Nil 35 Agriculture/forest/Barren : Agricultural land damaged 36 Geo-scientific Causes : Unscientific slope modification and unprotected cut slope made for road construction. Incessant rainfall is the triggering factor which resulted in the reduction of strength on saturation and increase in pore water pressure. 36 Remedial measures : Retaining wall with proper weep holes.			:	
26 Structure : -	24	1 0	:	COMPANY TO THE PROPERTY OF THE
27 Landuse/ Landcover : Mixed cultivation	25		:	Weathered charnockite
Hydrological condition : Dry		Structure	:	
29 Triggering Factor : Heavy Rainfall 30 Death of persons : Nil 31 People affected : Nil 32 Livestock Loss : Nil 33 Communication : Thalayad – Vayalada road damaged 34 Infrastructure : Nil 35 Agriculture/forest/Barren : Agricultural land damaged 36 Geo-scientific Causes : Unscientific slope modification and unprotected cut slope made for road construction. Incessant rainfall is the triggering factor which resulted in the reduction of strength on saturation and increase in pore water pressure. 37 Remedial measures : Retaining wall with proper weep holes.	27	Landuse/ Landcover	:	Mixed cultivation
29 Triggering Factor : Heavy Rainfall 30 Death of persons : Nil 31 People affected : Nil 32 Livestock Loss : Nil 33 Communication : Thalayad – Vayalada road damaged 34 Infrastructure : Nil 35 Agriculture/forest/Barren : Agricultural land damaged 36 Geo-scientific Causes : Unscientific slope modification and unprotected cut slope made for road construction. Incessant rainfall is the triggering factor which resulted in the reduction of strength on saturation and increase in pore water pressure. 37 Remedial measures : Retaining wall with proper weep holes.	28	Hydrological condition	2	Dry
30 Death of persons : Nil	29	Triggering Factor	1/	Heavy Rainfall
32 Livestock Loss : Nil	30		10	The state of the s
33 Communication : Thalayad – Vayalada road damaged 34 Infrastructure : Nil	31	People affected	1	Nil
34 Infrastructure : Nil	32	Livestock Loss	1	Nil
35 Agriculture/forest/Barren : Agricultural land damaged 36 Geo-scientific Causes : Unscientific slope modification and unprotected cut slope made for road construction. Incessant rainfall is the triggering factor which resulted in the reduction of strength on saturation and increase in pore water pressure. 37 Remedial measures : Retaining wall with proper weep holes.	33	Communication	7.	Thalayad – Vayalada road damaged
36 Geo-scientific Causes : Unscientific slope modification and unprotected cut slope made for road construction. Incessant rainfall is the triggering factor which resulted in the reduction of strength on saturation and increase in pore water pressure. 37 Remedial measures : Retaining wall with proper weep holes.	34	Infrastructure	74	Nil
made for road construction. Incessant rainfall is the triggering factor which resulted in the reduction of strength on saturation and increase in pore water pressure. 37 Remedial measures : Retaining wall with proper weep holes.	35	Agriculture/forest/Barren		Agricultural land damaged
37 Remedial measures : Retaining wall with proper weep holes.	36	Geo-scientific Causes	(made for road construction. Incessant rainfall is the triggering factor which resulted in the reduction of strength
	37	Remedial measures	The Mark	
		Remarks, if any	100	

39	Photos. Sketch of Plan & : section of the slide	
	130	
40	Summary/Abstract :	A debris slide was occurred on 14th June 2018 at Thalayad.
	1 / C · ·	Unscientific slope modification and unprotected cut slope
	1/15/2	made for road construction. Incessant rainfall is the
***	145: /r.c. X	triggering factor which resulted in the reduction of strength
	1:0/9	on saturation and increase in pore water pressure. Retaining
41	Data of Panarting	wall with proper weep holes has to be provided. 02/07/2018
41 42	Date of Reporting :	
42	Landslide Category :	Category III
	T O .	
Sli	de-14:	
~ 44	T: 11	

No	Field		Description
1	Slide No.	36	KER/KKD/49M15/2018/14
2	State	400	Kerala
3	District	A.	Kozhikode
4	Toposheet No.	4	49 M/15
5	Name of the slide	Q,	Poovanmala Landslide
6	NH/SH/Locality	5	Kattipara – Chamal - Thamarassery road
7	Latitude	/. ,	11.4653
8	Longitude	1	75.9337
9	Length	:	55 m
10	Width	••	10 m
11	Height	1	50 m
12	Area	50	550 m^2
13	Depth	A	$1.5 \mathrm{m}$
14	Volume	H	$825 m^3$
15	Runout distance		750 m (upto chamal church)
16	Type of Material	• •	Debris
17	Type of movement	:	Flow
18	Rate of movement	••	Very Rapid
19	Activity	••	Active
20	Distribution	:	Retrogressive
21	Style	:	Complex
22	Failure mechanism	:	Shallow rotational (≤ 5m) failure

23	History	:	14 th June 2018 (03:00 hrs)
24	Geomorphology	:	Lowly dissected slope. Debris flow towards N 100°
25	Geology/Lithology	:	Migmatized gneiss
26	Structure	:	-
27	Landuse/ Landcover	:	Mixed cultivation
28	Hydrological condition	:	Wet
29	Triggering Factor	:	Heavy Rainfall
30	Death of persons		Nil
31	People affected	7	Nil
32	Livestock Loss		Nil
33	Communication	-	Kattipara – Chamal road and one unmetalled road got damaged
34	Infrastructure	:	Pipe culvert damaged.
35	Agriculture/forest/Barren	:	Agricultural land damaged
36	Geo-scientific Causes	-	Landslide initiated as debris slide and then transformed to
	124/08		debris flow. Excessive rainfall is the triggering factor which
			resulted in the reduction of strength on saturation and
	197-7.3		increase in pore water pressure.
37	Remedial measures	:	The existing nala path has to be preserved and avoid its blockage
38	Remarks, if any		
39	Photos. Sketch of Plan & section of the slide		
40	Summary/Abstract		On 14 th June 2018, a debris flow occurred at Poovanmala near Chamal. This landslide initiated as debris slide and then transformed to debris flow. Excessive rainfall is the triggering factor which resulted in the reduction of strength on saturation and increase in pore water pressure. The existing nala path has to be preserved and avoid its blockage.
41	Date of Reporting	:	02/07/2018
42	Landslide Category	:	Category II

Slide-15:

	de-15:		
No	Field		Description
1	Slide No.	:	KER/KKD/49M15/2018/15
2	State	:	Kerala
3	District	:	Kozhikode
4	Toposheet No.	:	49 M/15
5	Name of the slide	:	Theyyapara Landslide
6	NH/SH/Locality		Kodencheri – Theyyapara road
7	Latitude		11.4337
8	Longitude	A: 1	75.9931
9	Length	-	70 m
10	Width	·	55 m
11	Height	1:0	50 m
12	Area	- 01	$3850 m^2$
13	Depth	:	1.5 m
14	Volume	:	5775 m ³
15	Runout distance	:	90 m (upto nala downslope)
16	Type of Material	1:	Debris
17	Type of movement	d	Slide
18	Rate of movement	1:5	Rapid
19	Activity	W	Active
20	Distribution	15	Retrogressive
21	Style	-8	Single
22	Failure mechanism	1	Shallow rotational (≤ 5m) failure
23	History	:	14 th June 2018 (03:00 hrs)
24	Geomorphology	1:	Lowly dissected slope. Slide debris flown towards N 240°
25	Geology/Lithology	1.7	Hornblende biotite gneiss
26	Structure	1400	- ATATATA
27	Landuse/ Landcover	1	Rubber plantation
		TE.	THE DOVERNMENT OF THE PERSON O
28	Hydrological condition	1	Wet Home Bainfall
29	Triggering Factor	-6	Heavy Rainfall
30	Death of persons	12	Nil
31	People affected	/	Nil
32	Livestock Loss	1	Nil
33	Communication		Kodencheri – Theyyapara road damaged
34	Infrastructure	:	Nil 3 3
35	Agriculture/forest/Barren	74 L	Agricultural land damaged
36	Geo-scientific Causes		Unscientific slope modification and unprotected cut slope made for road construction. Incessant rainfall is the triggering factor which resulted in the reduction of strength on saturation and increase in pore water pressure.
37	Remedial measures		Retaining wall with proper drainage outlet may be provided
38	Remarks, if any	:	Seepage noticed at the toe (Road bench level). At lower slope three houses observed. Palaeoslide observed at left flank of the landslide.

39	Photos. Sketch of Plan & section of the slide		
40	Summary/Abstract	:	A debris slide was occurred on 14 th June 2018 at Theyyapara. Unscientific slope modification and unprotected cut slope made for road construction. Incessant rainfall is the triggering factor which resulted in the reduction of strength on saturation and increase in pore water pressure. The important remedial measures include provision of retaining wall with proper drainage outlet.
41	Date of Reporting	:	02/07/2018
42	Landslide Category	:	Category II

Slide-16.

No	Field		Description
1	Slide No.	:	KER/KKD/58A3/2018/16
2	State	()	Kerala
3	District	Ţ,	Kozhikode
4	Toposheet No.	74	58 A/3
5	Name of the slide	:	Kandapanchal - 1 Landslide
6	NH/SH/Locality	:	Nellipoyil – Kandapanchal road
7	Latitude	/	11.4441
8	Longitude	N	76.0709
9	Length	1	22 m
10	Width	1.1	10 m
11	Height	70	18 m
12	Area		$220 m^2$
13	Depth	-4	1 m
14	Volume	7	$220 m^3$
15	Runout distance	:	Upto the river
16	Type of Material	:	Debris
17	Type of movement	:	Slide
18	Rate of movement	:	Rapid
19	Activity	:	Reactivated
20	Distribution	:	Retrogressive
21	Style	:	Single

23 History 1 13th June 2018 (17:30 hrs)	22	Failure mechanism	:	Shallow rotational ($\leq 5m$) failure
25 Geology/Lithology : Gneiss 26 Structure : - 27 Landuse/Landcover : Mixed cultivation 28 Hydrological condition : Wet 29 Triggering Factor : Heavy Rainfall 30 Death of persons : Nil 31 People affected : Nil 32 Livestock Loss : Nil 33 Communication : Nil 34 Infrastructure : Nil 35 Agriculture/forest/Barren : About 15 cents agricultural land damaged 36 Geo-scientific Causes : Removal of toe support due to river bank erosion (Elaw puzha flows at the downstream eroded the bank). Incertainfall is the triggering factor which resulted in reduction of strength on saturation and increase in water pressure. 37 Remedial measures : Provide retaining structures/river bank protection structure with proper drainage holes. 38 Remarks, if any : - 39 Photos. Sketch of Plan & section of the slide : Support due to river bank erosion. Incessant rainfall it triggering factor which resulted in the reduction of structures/river bank protection structures/river bank erosion. Incessant rainfall it triggering factor which resulted in the reduction of structures/river bank erosion. Incessant rainfall it triggering factor which resulted in the reduction of structures/river bank erosion. Incessant rainfall it triggering factor which resulted in the reduction of structures/river bank protection structures/river bank protectio			:	, , ,
26 Structure			:	Lowly dissected slope. The slide material flown towards N
27	25	Geology/Lithology	:	Gneiss
28 Hydrological condition : Wet 29 Triggering Factor : Heavy Rainfall 30 Death of persons : Nil 31 People affected : Nil 32 Livestock Loss : Nil 33 Communication : Nil 34 Infrastructure : Nil 35 Agriculture/forest/Barren : About 15 cents agricultural land damaged 36 Geo-scientific Causes : Removal of toe support due to river bank erosion (Elaw puzha flows at the downstream eroded the bank). Incerainfall is the triggering factor which resulted in reduction of strength on saturation and increase in water pressure. 37 Remedial measures : Provide retaining structures/river bank protection structures with proper drainage holes. 38 Remarks, if any : : 39 Photos. Sketch of Plan & : section of the slide 40 Summary/Abstract : On 13th June 2018, a debris slide was occurrer Kandapanchal. The main causes include removal of support due to river bank erosion. Incessant rainfall in triggering factor which resulted in the reduction of strong support due to river bank erosion. Incessant rainfall in triggering factor which resulted in the reduction of strong support due to river bank protection structures on saturation and increase in pore water pressure. Pretaining structures/river bank protection structures on saturation and increase in pore water pressure. Pretaining structures/river bank protection structures on saturation and increase in pore water pressure. Pretaining structures/river bank protection structures on saturation and increase in pore water pressure. Pretaining structures/river bank protection structures on saturation and increase in pore water pressure. Pretaining structures/river bank protection structures/river bank p	26	Structure	:	-
29 Triggering Factor : Heavy Rainfall	27	Landuse/ Landcover	:_	Mixed cultivation
Death of persons : Nil		·		
Summary/Abstract Summary/Abs		Triggering Factor	Ď.	Heavy Rainfall
32 Livestock Loss : Nil			:	Nil
33 Communication : Nil			:_	Nil
Infrastructure : Nil	32			Nil
35 Agriculture/forest/Barren 36 Geo-scientific Causes 37 Remedial measures 38 Remarks, if any 39 Photos. Sketch of Plan & section of the slide 40 Summary/Abstract 30 Summary/Abstract 31 Summary/Abstract 32 Summary/Abstract 33 Summary/Abstract 34 Summary/Abstract 35 Summary/Abstract 36 Summary/Abstract 37 Summary/Abstract 38 Summary/Abstract 39 Summary/Abstract 30 Summary/Abstract 30 Summary/Abstract 30 Summary/Abstract 31 Summary/Abstract 32 Summary/Abstract 33 Summary/Abstract 34 Summary/Abstract 35 Summary/Abstract 36 Summary/Abstract 37 Summary/Abstract 38 Summary/Abstract 39 Summary/Abstract 30 Summary/Abstract 30 Summary/Abstract 30 Summary/Abstract 31 Summary/Abstract 32 Summary/Abstract 33 Summary/Abstract 34 Summary/Abstract 35 Summary/Abstract 36 Summary/Abstract 37 Summary/Abstract 38 Summary/Abstract 39 Summary/Abstract 30 Summary/Abstract 30 Summary/Abstract 30 Summary/Abstract 31 Summary/Abstract 32 Summary/Abstract 33 Summary/Abstract 34 Summary/Abstract 35 Summary/Abstract 36 Summary/Abstract 37 Summary/Abstract 38 Summary/Abstract 39 Summary/Abstract 30 Summary/Abstract 30 Summary/Abstract 30 Summary/Abstract 31 Summary/Abstract 32 Summary/Abstract 33 Summary/Abstract 34 Summary/Abstract 35 Summary/Abstract 36 Summary/Abstract 37 Summary/Abstract 38 Summary/Abstract 39 Summary/Abstract 30 Summary/Abstract 30 Summary/Abstract 30 Summary/Abstract 31 Summary/Abstract 32 Summary/Abstract 33 Summary/Abstract 34 Summary/Abstract 35 Summary/Abstract 36 Summary/Abstract 37 Summary/Abstract 38 Summary/Abstract 39 Summary/Abstract 30 Summary/Abstract 30 Summary/Abstract 30 Summary/Abstract 30 Summary/Abstract 31 Summary/Abstract 32 Summary/Abstract 33 Summary/Abstract 34 Summary/Abstract 35 Summary/Abstract 36 Summary/Abstract 37 Summary/Abstract 38 Summary/Abstract 39 Summary/Abstract 30 Summary/Abstract 30 Summary/Abstract 30 Summary/Abstract 30 Summary/Abstract 30 Summary/Abstract 30 Summary/Abstract 31 Summar			1	
36 Geo-scientific Causes : Removal of toe support due to river bank erosion (Elaw puzha flows at the downstream eroded the bank). Incerainfall is the triggering factor which resulted in reduction of strength on saturation and increase in water pressure. 37 Remedial measures : Provide retaining structures/river bank protection struct with proper drainage holes. 38 Remarks, if any : Photos. Sketch of Plan & section of the slide : On 13th June 2018, a debris slide was occurre Kandapanchal. The main causes include removal of support due to river bank erosion. Incessant rainfall it triggering factor which resulted in the reduction of structures on saturation and increase in pore water pressure. Pretaining structures/river bank protection structures			.74	
puzha flows at the downstream eroded the bank). Incerainfall is the triggering factor which resulted in reduction of strength on saturation and increase in water pressure. 37 Remedial measures : Provide retaining structures/river bank protection structures, if any : - 38 Remarks, if any : - 39 Photos. Sketch of Plan & : section of the slide in the reduction of structures in pore water pressure. Pretaining structures/river bank protection structures			:	
rainfall is the triggering factor which resulted in reduction of strength on saturation and increase in water pressure. 37 Remedial measures : Provide retaining structures/river bank protection struct with proper drainage holes. 38 Remarks, if any : :	36	Geo-scientific Causes	:	Removal of toe support due to river bank erosion (Elavanchi
reduction of strength on saturation and increase in water pressure. 37 Remedial measures : Provide retaining structures/river bank protection struct with proper drainage holes. 38 Remarks, if any : - 39 Photos. Sketch of Plan & : section of the slide : 40 Summary/Abstract : On 13th June 2018, a debris slide was occurred Kandapanchal. The main causes include removal of support due to river bank erosion. Incessant rainfall in triggering factor which resulted in the reduction of structures on saturation and increase in pore water pressure. Pretaining structures/river bank protection structures		1/2/0		
Remedial measures 2. Provide retaining structures/river bank protection struct with proper drainage holes. 3. Remarks, if any 3. Photos. Sketch of Plan & : section of the slide 4. Summary/Abstract 3. Summary/Abstract 3. On 13th June 2018, a debris slide was occurre Kandapanchal. The main causes include removal of support due to river bank erosion. Incessant rainfall in triggering factor which resulted in the reduction of structures on saturation and increase in pore water pressure. Pretaining structures/river bank protection structures		10-1		rainfall is the triggering factor which resulted in the
Remedial measures Provide retaining structures/river bank protection struction with proper drainage holes. Remarks, if any Photos. Sketch of Plan & section of the slide		1715 / CS	A	
38 Remarks, if any 39 Photos. Sketch of Plan & : section of the slide 40 Summary/Abstract : On 13 th June 2018, a debris slide was occurre Kandapanchal. The main causes include removal of support due to river bank erosion. Incessant rainfall it triggering factor which resulted in the reduction of structures on saturation and increase in pore water pressure. Pretaining structures/river bank protection structures			0	
38 Remarks, if any 39 Photos. Sketch of Plan & : section of the slide 10 Summary/Abstract 11 Summary/Abstract 12 Summary/Abstract 13 June 2018, a debris slide was occurre Kandapanchal. The main causes include removal of support due to river bank erosion. Incessant rainfall in triggering factor which resulted in the reduction of structures on saturation and increase in pore water pressure. Pretaining structures/river bank protection structures	37	Remedial measures	"	
39 Photos. Sketch of Plan & : section of the slide 10 Summary/Abstract : On 13th June 2018, a debris slide was occurre Kandapanchal. The main causes include removal of support due to river bank erosion. Incessant rainfall it triggering factor which resulted in the reduction of structures on saturation and increase in pore water pressure. Pretaining structures/river bank protection structures	20	Domarka if any	-8	with proper arainage noies.
40 Summary/Abstract : On 13 th June 2018, a debris slide was occurre Kandapanchal. The main causes include removal of support due to river bank erosion. Incessant rainfall in triggering factor which resulted in the reduction of structures on saturation and increase in pore water pressure. Provide the summary of the sum			A	
Kandapanchal. The main causes include removal of support due to river bank erosion. Incessant rainfall is triggering factor which resulted in the reduction of structuration and increase in pore water pressure. Pressure tretaining structures/river bank protection structures		section of the slide		
				Kandapanchal. The main causes include removal of toe support due to river bank erosion. Incessant rainfall is the triggering factor which resulted in the reduction of strength on saturation and increase in pore water pressure. Provide retaining structures/river bank protection structures with proper drainage holes.
41 Date of Reporting : 02/07/2018	41	Date of Reporting	:	02/07/2018
42 Landslide Category : Category III	42		:	Category III

Slide-17:

No	Silde-17: Field		Description
1	Slide No.	:	KER/KKD/58A3/2018/17
2	State	:	Kerala
3	District	:	Kozhikode
4	Toposheet No.	:	58 A/3
5	Name of the slide	:	Kandapanchal - 2 Landslide
6	NH/SH/Locality		Nellipoyil – Mundur - Kandapanchal road
7	Latitude		11.4450
8	Longitude	1	76.0739
9	Length	U	50 m
10	Width		42 m
11	Height	and the same of	18 m
12	Area	:	$2100 m^2$
13	Depth	J.	6 m
14	Volume	:	12600 m ³
15	Runout distance	:	Upto the nala downslope
16	Type of Material	:	Debris
17	Type of movement	:	Slide
18	Rate of movement	:	Very Rapid
19	Activity	:	Active
20	Distribution	:	Retrogressive
21	Style	:	Single
22	Failure mechanism	:	Deep rotational (≥ 5m) failure
23	History	À	13 th June 2018 (01:00 hrs)
24	Geomorphology	7)	Lowly dissected slope. Slide material flown towards N 185°.
25	Geology/Lithology	e de la	Gabbro/Dolerite with pegmatite veins
26	Structure	Jan.	Parallel set of pegmatite veins with varying thickness
		j.	trending N 50° – N 230° present
27	Landuse/ Landcover	3.7	Mixed cultivation (Rubber, coconut, etc.)
28	Hydrological condition	And and	Wet
29	Triggering Factor	- 1	Heavy Rainfall
30	Death of persons	:	Nil
31	People affected	:,/	Nil
32	Livestock Loss	€	Nil OE I
33	Communication	:	Unmetalled road blocked
34	Infrastructure		Nil
35	Agriculture/forest/Barren	11	70 cents agricultural land damaged
36	Geo-scientific Causes	7.5	Unscientific slope modification made for road construction
			and cultivation. Incessant rainfall is the triggering factor
		-	which resulted in the reduction of strength on saturation and
		- 1	increase in pore water pressure.
37	Remedial measures	:	Removal of precarious boulders along the slide plane.
			Natural drainage system has to be preserved.
38	Remarks, if any	:	A cut road is observed above the crown of the landslide.

39	Photos. Sketch of Plan & : section of the slide	
40	Summary/Abstract :	A debris slide was occurred on 13 th June 2018 at Kandapanchal. Geoscientific cause includes unscientific slope modification made for road construction and cultivation. Incessant rainfall is the triggering factor which resulted in the reduction of strength on saturation and increase in pore water pressure. It is suggested to remove precarious boulders along the slide plane. Natural drainage system has to be preserved.
41	Date of Reporting :	02/07/2018
42	Landslide Category :	Category II

Slide-18:

No	Field		Description
1	Slide No.	:	KER/KKD/58A3/2018/18
2	State	:	Kerala
3	District	:	Kozhikode
4	Toposheet No.	:	58 A/3
5	Name of the slide	:	Kulakkadanmala Landslide

6	NH/SH/Locality	:	Mukkam - Kakkadampoyil road
7	Latitude	:	11.3041
8	Longitude	:	76.0441
9	Length	:	35 m
10	Width	:	8 m
11	Height	:	30 m
12	Area	:	$280 m^2$
13	Depth	100	1 m
14	Volume	5	$280 m^3$
15	Runout distance	1	900 m
16	Type of Material	9	Debris
17	Type of movement	-	Flow
18	Rate of movement	and the same	Rapid
19	Activity	:	Active
20	Distribution	ji.	Confined
21	Style	:	Complex
22	Failure mechanism	:	Shallow rotational ($\leq 5m$) failure
23	History	:	14 th June 2018 (05:30 hrs)
24	Geomorphology	:	Lowly dissected slope. Debris material flown towards N 10°.
25	Geology/Lithology	: 1	Charnockite gneiss
26	Structure	:	CADDITION AND AND AND AND AND AND AND AND AND AN
27	Landuse/ Landcover	:	Mixed cultivation (Mainly coconut)
28	Hydrological condition	:	Dry
29	Triggering Factor		Heavy Rainfall
30	Death of persons	Ť.	Nil
31	People affected	7/	Nil
32	Livestock Loss	10	Nil
33	Communication		Foot track damaged
34	Infrastructure	K	Nil
35	Agriculture/forest/Barren	7.	Agricultural land damaged
36	Geo-scientific Causes	X	Landslide initiated at the contact between rock and overburden in the form of debris slide and then transformed in to debris flow. Excessive rainfall is the triggering factor which resulted in the reduction of strength on saturation and increase in pore water pressure.
37	Remedial measures	2000	Precarious boulders along the slide path have to be removed. Avoid unscientific hill slope modifications.
38	Remarks, if any	1	

39	Photos. Sketch of Plan & : section of the slide	
40	Summary/Abstract :	On 14 th June 2018 a debris flow occurred at Kulakkadanmala. Landslide initiated at the contact between rock and overburden in the form of debris slide and then transformed in to debris flow. Excessive rainfall is the triggering factor which resulted in the reduction of strength on saturation and increase in pore water pressure. Important remedial measures include removal of precarious boulders along the slide path and to avoid unscientific hill slope modifications.
41	Date of Reporting :	03/07/2018
42	Landslide Category :	Category III

Slide-19:

No	Field		Description
1	Slide No.	8	KER/KKD/58A3/2018/19
2	State	Á	Kerala
3	District		Kozhikode
4	Toposheet No.	١,	58 A/3
5	Name of the slide	٠,	Vattachuvadu Landslide
6	NH/SH/Locality	•••	Pulikkayam - Thusharagiri road
7	Latitude	••	11.4562
8	Longitude	1	76.0429
9	Length	10	60 m
10	Width	A	30 m
11	Height	ŀ	22 m
12	Area		1800 m^2
13	Depth	•	1 m
14	Volume	:	1800 m^3
15	Runout distance	:	400 m (upto the nala at downslope)
16	Type of Material	••	Debris
17	Type of movement	••	Flow
18	Rate of movement	:	Very Rapid
19	Activity	:	Active

20	Distribution	:	Confined
21	Style	:	Complex
22	Failure mechanism	:	Shallow planar (≤ 5m) failure
23	History	:	12 th June 2018 (18:00 hrs)
24	Geomorphology	:	Lowly dissected slope. The slide is limited with an escarpment
			face at the uphill side and is having steep slope town N 280°.
25	Geology/Lithology	:	Granite gneiss
26	Structure	100	
27	Landuse/ Landcover		Mixed cultivation (Mainly Rubber)
28	Hydrological condition		Dry
29	Triggering Factor	3	Heavy Rainfall
30	Death of persons	-	Nil
31	People affected	:	Nil
32	Livestock Loss	• •	Nil
33	Communication	p.	Unmetalled road damaged
34	Infrastructure	:	Three houses got damaged, two wells got buried
35	Agriculture/forest/Barren	:	About 1.5 acre Agricultural land damaged
36	Geo-scientific Causes	:	Landslide initiated as debris slide at the contact between rock
	1711: / 15		and overburden and then transformed in to debris flow.
	1:0/0	(Excessive rainfall is the triggering factor which resulted in
	10/10		the reduction of strength on saturation and increase in pore
			water pressure.
37	Remedial measures	:	Precarious boulders along the slide flow path have to be
			removed/treated. Avoid blockage of drainage system along
		4	the hill slope.
38	Remarks, if any	7/	At the crown area the debris slide fall upto about 50 to 60 m
	L Lib EV	1	towards N 275° and then converted to debris flow
		1	downstream towards N 285° upto the tributary below.
39	Photos. Sketch of Plan &	N.	
	section of the slide	7	
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Slide-20:

No	Field		Description
1	Slide No.	:	KER/KKD/58A3/2018/20
2	State	:	Kerala
3	District	:	Kozhikode
4	Toposheet No.	:	58 A/3
5	Name of the slide	:	Vendekkumpoyil-1 Landslide
6	NH/SH/Locality	:	Chempukadavu - Vendekumpoyil road

7	Latitude	:	11.4616
8	Longitude	:	76.0379
9	Length	:	180 m
10	Width	:	8 m
11	Height	:	m
12	Area	:	m^2
13	Depth	:	m
14	Volume	100	m^3
15	Runout distance	Ü	upto the nala at downslope
16	Type of Material	1	Debris
17	Type of movement		Flow
18	Rate of movement		Rapid
19	Activity		Active
20	Distribution	:	Confined
21	Style	Ä	Complex
22	Failure mechanism	:	Shallow rotational failure
23	History	:	13 th June 2018 (04:00 hrs)
24	Geomorphology	:	Lowly dissected slope. Slide debris flown towards N 60°
25	Geology/Lithology	:	Charnockite gneiss
26	Structure	:	- (E3)(E3)(E)() >- (-)
27	Landuse/ Landcover	:	Mixed vegetation
28	Hydrological condition	:	Dry
29	Triggering Factor	:	Heavy Rainfall
30	Death of persons		Nil
31	People affected	4	Nil
32	Livestock Loss	7/	Nil
33	Communication	1	Chempukadavu - Vendekumpoyil road blocked
34	Infrastructure	7	Nil
35	Agriculture/forest/Barren		Agricultural land damaged
36	Geo-scientific Causes	5	Excessive rainfall is the triggering factor which resulted in the reduction of strength on saturation and increase in pore water pressure.
37	Remedial measures	(The natural flow may not be blocked along the nala.
38	Remarks, if any	1	The debris material flows through the already existing nala path.

39	Photos. Sketch of Plan & section of the slide		
40	Summary/Abstract		A debris flow was occurred on 13 th June 2018 at Vendekkumpoyil. The debris material flows through the already existing nala path. Excessive rainfall is the triggering factor which resulted in the reduction of strength on saturation and increase in pore water pressure. The natural flow may not be blocked along the nala.
41	Date of Reporting	13	03/07/2018
42	Landslide Category	100-	Category III

Slide-21

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No	Field		Description
1	Slide No.	/	KER/KKD/58A3/2018/21
2	State	:	Kerala
3	District	٠.	Kozhikode
4	Toposheet No.	1	58 A/3
5	Name of the slide	1	Vendekkumpoyil-2 Landslide
6	NH/SH/Locality	41	Chempukadavu - Vendekumpoyil road
7	Latitude	ļ	11.4600
8	Longitude		76.0382
9	Length	••	80 m
10	Width	••	8 m
11	Height	:	m
12	Area	••	$640 m^2$
13	Depth	••	1 m
14	Volume	:	m^3

15	Runout distance		40 m
16	Type of Material		Debris
17	Type of movement		Flow
18	Rate of movement		Very Rapid
19	Activity	:	Active
20	Distribution		Widening
21	Style	:	Complex
22	Failure mechanism		Shallow rotational failure
23	History		13 th June 2018 (18:00 hrs)
24			Lowly dissected slope. Debris material flown towards N 120°.
25	Geomorphology Geology/Lithology	0	
26	Geology/Lithology Structure	-	Granite gneiss
			Mind and in (Dubban Annamy)
27	Landuse/ Landcover	:	Mixed cultivation (Rubber, Arecanut, etc.)
28	Hydrological condition	:	Dry
29	Triggering Factor	*	Heavy Rainfall
30	Death of persons	:	Nil
31	People affected	:	Nil
32	Livestock Loss	:	Nil
33	Communication	:	Chempukadavu - Vendekumpoyil road blocked
34	Infrastructure	:	One house totally damaged
35	Agriculture/forest/Barren	:	Agricultural land damaged
36	Geo-scientific Causes	:	Landslide initiated as debris slide and then transformed in to debris flow. Excessive rainfall is the triggering factor which
	110 .2	<u></u>	resulted in the reduction of strength on saturation and increase in pore water pressure.
37	Remedial measures	12	Precarious boulders along the debris flow path have to be
		10	removed. The natural flow of water may not be blocked along the hill slopes. Retaining structure with proper drain holes
		d.	has to be provided.
38	Remarks, if any	1	Crown cracks are present which increases the threat at this
		ς.,	location.
39	Photos. Sketch of Plan &	- 4	
	section of the slide		
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40	Summary/Abstract :		Another debris flow occurred on 13th June 2018 at Vendekumpoyil which resulted in the destruction of one house and blockage to Chempukadavu-Vendekumpoyil road. Crown cracks are present which increases the threat at this location. The landslide initiated as debris slide and then transformed in to debris flow. Excessive rainfall is the triggering factor which resulted in the reduction of strength on saturation and increase in pore water pressure. Remedial measures include (a) precarious boulders along the debris flow path has to be removed, (b) the natural flow of water may not be blocked along the hill slopes and (c) Retaining structure with proper drain holes has to be provided.
41	Date of Reporting :		03/07/2018
42	Landslide Category :	N	Category II

Slide-22:

No	Field		Description
1	Slide No.	1	KER/KKD/58A3/2018/22
2	State	7	Kerala
3	District	:	Kozhikode
4	Toposheet No.	:	58 A/3
5	Name of the slide	J	Kozhikodanchal Landslide
6	NH/SH/Locality	16	Kozhikodanchal – Ambedkar Colony road
7	Latitude	А	11.4650
8	Longitude	1.1	76.0321
9	Length	Н	35 m
10	Width		7 m
11	Height	:	25 m
12	Area	:	$245 m^2$
13	Depth	:	1m
14	Volume	:	$245 m^3$
15	Runout distance	:	160 m (Up to the cut road at down slope)
16	Type of Material	:	Debris

17	Type of movement	T :	Flow
18	Rate of movement		Very Rapid
19	Activity	:	Active
20	Distribution	:	Confined
21	Style		Complex
22	Failure mechanism	:	Shallow rotational failure
23	History		12 th June 2018 (17:30 hrs)
24	Geomorphology		Lowly dissected slope. Debris material flown towards N 155°.
	Geomorphology	E	The terrain has a general slope of about 24° .
25	Geology/Lithology	-	Gneiss
26	Structure	U	-
27	Landuse/ Landcover	÷	Cultivation (Rubber)
		and the said	
28	Hydrological condition	:	Dry Drider
29	Triggering Factor	:	Heavy Rainfall
30	Death of persons	P.	Nil
31	People affected	:	Nil
32	Livestock Loss	:	Nil
33	Communication	:	Road damaged
34	Infrastructure	:	Nil
35	Agriculture/forest/Barren	:	Agricultural land damaged (Rubber Plantation)
36	Geo-scientific Causes	:	Landslide initiated as debris slide and then transformed in to
			debris flow. Excessive rainfall is the triggering factor which
			resulted in the reduction of strength on saturation and
			increase in pore water pressure.
37	Remedial measures		Precarious boulders along the debris flow path have to be
		K	removed/treated. The natural flow should not be blocked
•	- L L D F	10	along the hill slope.
38	Remarks, if any	- 1	
39	Photos. Sketch of Plan &	K	
	section of the slide	5	
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40	Summary/Abstract	:	On 12th June 2018, a debris flow was occurred at
			Kozhikodanchal near Ambedkar Colony. The landslide
			initiated as debris slide and then transformed in to debris
			flow. Excessive rainfall is the triggering factor which resulted
1			in the reduction of strength on saturation and increase in
			The first of strength of senting the sentence the sentence the

			pore water pressure. Precarious boulders along the debris flow path have to be removed/treated. The natural flow may not be blocked along the hill slope.
41	Date of Reporting	:	03/07/2018
42	Landslide Category	:	Category III

Slide-23:

No	Field		Description
1	Slide No.	1:3	KER/KKD/58A3/2018/23
2	State	W.	Kerala
3	District	-	Kozhikode
4	Toposheet No.	:0	58 A/3
5	Name of the slide	160	Ambedkar Colony -1 Landslide
6	NH/SH/Locality	:	Chempukadavu – Palakunnu – Ambedkar Colony
7	Latitude	:	11.4618
8	Longitude	:	76.0290
9	Length	:	300 m (including the runout distance)
10	Width	A	8 m
11	Height		m
12	Area		m^2
13	Depth	Ţ,	1 m
14	Volume	1/8	$m^3 \ge 1$
15	Runout distance	1	m
16	Type of Material	:	Debris A
17	Type of movement	:	Flow
18	Rate of movement	/1	Rapid
19	Activity	70	Active
20	Distribution	YAR	Confined
21	Style	J.	Single
22	Failure mechanism		Shallow rotational failure
23	History		12 th June 2018 (16:15 hrs)
24	Geomorphology	>	Lowly dissected slope. Debris material flown towards N 160°.
25	Geology/Lithology	4,	Hornblende biotite gneiss
26	Structure		Foliation dipping 85° towards N 100°. Pegmatite veins of ~50cm are found parallel to foliation plane. Joint dipping 82° towards N 200°.
27	Landuse/ Landcover	1	Mixed cultivation (Mainly Rubber)
28	Hydrological condition	1	Wet
29	Triggering Factor		Heavy Rainfall
30	Death of persons	÷	Nil
31	People affected		Nil
32	Livestock Loss	:	Nil
33	Communication	:	Unmetalled road blocked
34	Infrastructure	:	Nil
35	Agriculture/forest/Barren	:	About 2 acre Agricultural land damaged
36	Geo-scientific Causes	:	Excessive rainfall is the triggering factor which resulted in the reduction of strength on saturation and increase in pore

			water pressure.
37	Remedial measures	:	Precarious boulders along the debris flow path have to be removed. The natural flow may not be blocked along the nala.
38	Remarks, if any	:	-
39	Photos. Sketch of Plan & section of the slide	:	-
40	Summary/Abstract		On 12 th June 2018, a debris flow occurred at Ambedkar Colony. Excessive rainfall is the triggering factor which resulted in the reduction of strength on saturation and increase in pore water pressure. Immediate remedial measures include removal of precarious boulders along the debris flow path and non-blockage of the natural flow along the nala.
41	Date of Reporting	:	03/07/2018
42	Landslide Category	i	Category III
	Slide-24:		0 31
No	Field		Description
1	Slide No.	:	KER/KKD/58A3/2018/24

No	Field		Description
1	Slide No. :		KER/KKD/58A3/2018/24
2	State :	:	Kerala
3	District :	:	Kozhikode
4	Toposheet No. :	:	58 A/3
5	Name of the slide :		Ambedkar colony-2 Landslide
6	NH/SH/Locality :		Chempukadavu – Palakunnu – Ambedkar Colony
7	Latitude :	3	11.4628
8	Longitude :		76.0259
9	Length :	No.	60 m
10	Width :	:	6 m
11	Height :	1	30 m
12	Area :		$360 m^2$
13	Depth :	1	1 m
14	Volume :	:	360m^3
15	Runout distance :	:	290 m
16	Type of Material :	and the same	Debris
17	Type of movement :	-	Flow
18	Rate of movement :		Rapid
19	Activity :		Active
20	Distribution :		Retrogressive
21	Style :	3	Complex
22	Failure mechanism :	Ŕ	Shallow rotational (≤ 5m) failure
23	History :		14 th June 2018 (04:00 hrs)
24	Geomorphology :	:	Lowly dissected slope. Debris material flown towards N 295°.
25	Geology/Lithology :	:	Gneiss. Weathered at places
26	Structure :	•	-
27	Landuse/ Landcover :	:	Rubber plantation
28	Hydrological condition :	:	Dry
29	Triggering Factor :	;	Heavy Rainfall

30	Death of persons	Τ.	Nil
31	People affected		Nil
32	Livestock Loss	:	Nil
33	Communication	· ·	Unmetalled road blocked.
34	Infrastructure	<u> </u>	
35	Agriculture/forest/Barren	•	One electrical poll damaged About 30 cents of Apricultural land damaged
36	Geo-scientific Causes	•	About 30 cents of Agricultural land damaged Landslide initiated as debris slide and then transformed in to
			debris flow. Excessive rainfall is the triggering factor which resulted in the reduction of strength on saturation and increase in pore water pressure.
37	Remedial measures	:	Precarious boulders along the debris flow path have to be removed. The natural flow should not be blocked along the hill slopes.
38	Remarks, if any	-7	The cut road got damaged, transverse cracks (4 m length)
	13 CM	. %	developed and retaining wall also damaged in the vicinity of this landslide. Such cracks are to be sealed and should not permit the water to percolate through it. Retaining wall has to be repaired with proper drain holes.
39	Photos. Sketch of Plan & section of the slide		

		50	
40	Summary/Abstract	÷	On 14th June 2018, another debris flow occurred at Ambedkar Colony resulted in the damage to cut road. Transverse cracks were developed and retaining wall also damaged. The landslide initiated as debris slide and then transformed in to debris flow. Excessive rainfall is the triggering factor which resulted in the reduction of strength on saturation and increase in pore water pressure. Remedial measures include (a) removal of precarious boulders along the debris flow path, (b) Natural flow of water should not be blocked along the hill slopes, (c) The cracks are to be sealed and should not permit the water to percolate through it and (d) Retaining wall has to be repaired with proper drain holes.
41	Date of Reporting	10	03/07/2018
42	Landslide Category	: `	Category III

Slide-25:

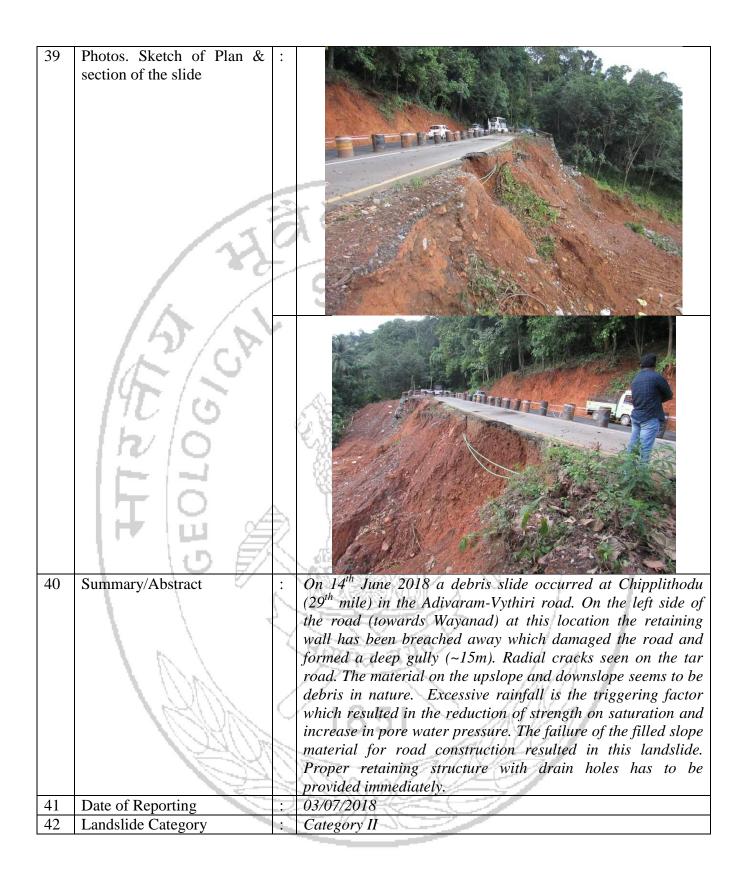
No	Field		Description
1	Slide No.	••	KER/KKD/58A3/2018/25
2	State	1	Kerala
3	District	2	Kozhikode
4	Toposheet No.	- 7	58 A/3
5	Name of the slide	S. pr	Nooranthodu LP School Landslide
6	NH/SH/Locality	1	Chempukadavu – Thusharagiri Road
7	Latitude	fr.	11.4675
8	Longitude	¥	76.0281
9	Length	f	350 m
10	Width	••	8 m
11	Height	••	30 m
12	Area	••	$2800 m^2$
13	Depth	••	4 m
14	Volume	:	$11200 m^3$
15	Runout distance	:	600 m (including length)
16	Type of Material	:	Debris

1.7	TD C .	ı	TI.
17	Type of movement	:	Flow
18	Rate of movement	:	Very Rapid
19	Activity	:	Reactivated (15 years back debris flow occurred)
20	Distribution	:	Retrogressive
21	Style	:	Multiple
22	Failure mechanism	:	Shallow rotational (≤ 5m) failure
23	History	:	12 th June 2018 (18:00 hrs & 19:00 hrs)
24	Geomorphology		Lowly dissected slope. The debris material flown towards N 5°.
25	Geology/Lithology	: 1	Biotite gneiss
26	Structure	74.	
27	Landuse/ Landcover	-	Mixed cultivation (Rubber, coconut, arecanut, coco, etc.)
28	Hydrological condition	:0	Dry
29	Triggering Factor	- 6	Heavy Rainfall
30	Death of persons	:	Nil
31	People affected	:	Nil
32	Livestock Loss	:	One cow injured
33	Communication	:	Panchayath road and the side wall of the nala got damaged.
34	Infrastructure	d	One House and one Temple got damaged
35	Agriculture/forest/Barren		20 cents of Agricultural land damaged
36	Geo-scientific Causes		Landslide initiated as debris slide and then transformed in to
	FO	000	debris flow along the pre-existing nala path. Excessive rainfall is the triggering factor which resulted in the reduction of strength on saturation and increase in pore water pressure.
37	Remedial measures	:	Precarious boulders along the debris flow path have to be removed. The natural flow may not be blocked along the nala.
38	Remarks, if any	100	The temple in the downslope area flooded with debris material. Initially the material flows from eastern side and then diverted to a northward slope. Material flows at two times 18:00 hrs and 19:00 hrs on 12 th June 2018.
39	Photos. Sketch of Plan &	D	
	section of the slide	3	



Slide-26:

	ue-20:		D
No	Field		Description
1	Slide No.	:	KER/KKD/58A3/2018/26
2	State	:	Kerala
3	District	:	Kozhikode
4	Toposheet No.	:	58 A/3
5	Name of the slide	:	Chipplithodu (29 th mile) Landslide
6	NH/SH/Locality	:	Adivaram – Vythiri (Thamarassery Churam) Road
7	Latitude	. 1	11.4891
8	Longitude	Ė٤	76.0235
9	Length	4	30 m
10	Width	-	40 m
11	Height	0	12 m
12	Area	- %	$\frac{12 \text{ m}}{1200 \text{ m}^2}$
13	Depth		2 m
14	Volume		$\frac{2400 \text{ m}^3}{2400 \text{ m}^3}$
15	Runout distance		90 m
16			Debris Debris
17	Type of Material	-20	Slide
	Type of movement Rate of movement	4	AND
18			Rapid
19	Activity		Active Patrograssive
20	Distribution	-80	Keirogressive
21	Style	:100	Single
22	Failure mechanism	: "	Shallow rotational ($\leq 5m$) failure
23	History	:	14 th June 2018 (06:30 hrs)
24	Geomorphology	:	Lowly dissected slope
25	Geology/Lithology	:41	Charnockite
26	Structure		
27	Landuse/ Landcover	15	Forest vegetation
28	Hydrological condition	10	Dry
29	Triggering Factor	1	Heavy Rainfall
30	Death of persons	Ŋ,	Nil
31	People affected	7	Nil
32	Livestock Loss	1:/	Nil
33	Communication	1	Adivaram – Vythiri (Thamarassery Churam) road damaged.
34	Infrastructure	:	Nil
35	Agriculture/forest/Barren	:	Nil
36	Geo-scientific Causes	1	Excessive rainfall is the triggering factor which resulted in
	1000	1	the reduction of strength on saturation and increase in pore
			water pressure. The failure of the filled slope material for
		100mm	road construction resulted in this landslide.
37	Remedial measures		Proper retaining structure with drain holes has to be
			provided immediately.
38	Remarks, if any	:	On the left side of the road (towards Wayanad) at this
	Training, it uity	•	location the retaining wall has been breached away which
			damaged the road and formed a deep gully (~15m). Radial
			cracks seen on the tar road. The material on the upslope and
			downslope seems to be debris in nature.
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Slide-27:

No	Field		Description
1	Slide No.	:	KER/KKD/58A2/2018/27
2	State	:	Kerala
3	District	:	Kozhikode

4	Toposheet No.	:	58 A/2
5	Name of the slide	:	Churam Landslide
6	NH/SH/Locality	:	Adivaram – Vythiri (Thamarassery Churam) Road
7	Latitude	:	11.5148
8	Longitude	:	76.0151
9	Length	:	15 m
10	Width	:	18 m
11	Height	:	10 m
12	Area	:]	$270 m^2$
13	Depth	: 1	0.8 m
14	Volume	7	$216 m^3$
15	Runout distance		
16	Type of Material	:0	Debris
17	Type of movement	: %	Slide
18	Rate of movement	:	Rapid
19	Activity	:	Active
20	Distribution	:	Retrogressive
21	Style	:	Single
22	Failure mechanism	Š	Shallow rotational (≤ 5m) failure
23	History		14 th June 2018
24	Geomorphology	\$	Moderately dissected slope. The debris material flown
		T,	towards N 255° upto the road bench level.
25	Geology/Lithology	W	Charnockite
26	Structure	: 3	5 15 15 15 15 15 15 15 15 15 15 15 15 15
27	Landuse/ Landcover	:	Forest vegetation
28	Hydrological condition	:	Dry
29	Triggering Factor	:46	Heavy Rainfall
30	Death of persons	T	Nil
31	People affected	10	Nil
32	Livestock Loss	17	Nil
33	Communication	A COL	Adivaram – Vythiri (Thamarassery Churam) road blocked.
34	Infrastructure	A.	Nil
35	Agriculture/forest/Barren	-2	Nil
36	Geo-scientific Causes	./	Unscientific slope modification and unprotected cut slope
	164011 C		made for road construction. Incessant rainfall is the
	11/1/1/1/1		triggering factor which resulted in the reduction of strength on saturation and increase in pore water pressure.
37	Remedial measures		Retaining wall with proper drainage outlet has to be provided
38	Remarks, if any	1	-
50	I Kemarks, ir any	2. 1	

39	Photos. Sketch of Plan & : section of the slide	
40	Summary/Abstract :	On 14 th June 2018, a debris slide occurred at churam road. The rock — overburden contact is the movement plane. Unscientific slope modification and unprotected cut slope made for road construction. Incessant rainfall is the triggering factor which resulted in the reduction of strength on saturation and increase in pore water pressure. Retaining wall with proper drainage outlet has to be provided.
41	Date of Reporting :	03/07/2018
42	Landslide Category :	Category III
	Slide-28:	

No	Field		Description
1	Slide No.	į: [']	KER/WYD/58A2/2018/01
2	State		Kerala
3	District	7	Wayanad
4	Toposheet No.	ΞŽ	58 A/2
5	Name of the slide	:	Aramalakunnu Landslide
6	NH/SH/Locality	••	Vythiri - Aramala Road
7	Latitude	1	11.5294
8	Longitude	2	76.0293
9	Length	1	18 m
10	Width		8 m
11	Height		12 m
12	Area		$144 m^2$
13	Depth	{	2 m
14	Volume	Ī	$288 m^3$
15	Runout distance	:	Upto the house in toe area
16	Type of Material	:	Soil
17	Type of movement	:	Slide
18	Rate of movement	:	Very Rapid
19	Activity	:	Active
20	Distribution	••	Retrogressive
21	Style	:	Single

22	Failure mechanism	:	Shallow rotational ($\leq 5m$) failure
23	History	Ė	14 th June 2018 (05:30 hrs)
24	Geomorphology	:	Lowly dissected slope. The slide material flown towards N 130°.
25	Geology/Lithology	:	Charnockite
26	Structure	:	-
27	Landuse/ Landcover	:	Mixed cultivation
28	Hydrological condition		Wet
29	Triggering Factor	ů.	Heavy Rainfall
30	Death of persons	ļ. '	Nil
31	People affected	:	3 nos.
32	Livestock Loss		Nil
33	Communication	1	Nil
34	Infrastructure	- %	One house totally damaged
35	Agriculture/forest/Barren	:	Nil
36	Geo-scientific Causes	:	Unscientific slope modification and unprotected cut slope made for house construction. Incessant rainfall is the triggering factor which resulted in the reduction of strength on saturation and increase in pore water pressure.
37	Remedial measures		The vertical cut may be protected with proper retaining wall with weep holes. Crown cracks are to be treated in order to avoid percolation of water.
38	Remarks, if any	FORM AND	Rock boulders are seen embedded in the soil column. Another adjacent house also got damaged with small stripping failures. Panchayat foot track passes above the crown area of this slide. Crown cracks are developed. Two houses located above this landslide are in threat. Another house adjacent to the damaged one, is also partially damaged with development of wall cracks. Two houses are located at the downslope along the flow path.
39	Photos. Sketch of Plan &	1	
	section of the slide		

40	Summary/Abstract		An earth side occurred on 14 th June 2018 at Aramalakunnu which affected the people and damage to the houses. Rock boulders are observed to be embedded in the soil column. Another adjacent house also got damaged with small stripping failures. Crown cracks are developed. Two houses located above this landslide are in threat. Another house adjacent to the damaged one is also partially damaged with development of wall cracks. Two houses are located at the downslope along the flow path. The important causes include (a) unscientific slope modification and unprotected cut slope made for house construction and (b) excessive rainfall is the triggering factor which resulted in the reduction of strength on saturation and increase in pore water pressure. It is suggested to provide proper retaining wall with weep holes at the vertically cut surfaces. Crown cracks are to be treated in order to avoid percolation of water.
41	Date of Reporting		04/07/2018
41		1	
42	Landslide Category	:	Category II

Slide-29:

No	Field		Description
1	Slide No.	10	KER/WYD/58A2/2018/02
2	State	11	Kerala
3	District		Wayanad
4	Toposheet No.	7	58 A/2
5	Name of the slide	4	Jawaharvidhya Nagar Landslide
6	NH/SH/Locality	:	Vythiri – Kalpetta road
7	Latitude	:	11.5356
8	Longitude	:	76.0215
9	Length	:	18 m
10	Width	:	60 m
11	Height	:	10 m
12	Area	:	$1080 m^2$

14 Volume	13	Depth	:	4 m
15 Runout distance : m 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 rotational (≤ 5m) failure 23 History : 14 th June 2018 (05:00 hrs) 24 Geomorphology : Rolling plain. The slide material flown towards N 230°. 25 Geology/Lithology : Charnockite 26 Structure : - 27 Landuse/ Landcover : Mixed cultivation 28 Hydrological condition : Dry 29 Triggering Factor : Heavy Rainfall 30 Death of persons : Nil 31 People affected : Nil 32 Livestock Loss : Nil 33 Communication : Nil 34 Infrastructure : One office building affected 35 Agriculture/forest/Barren : Nil		1	:	
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 rotational (≤ 5m) failure 23 History : I4 th June 2018 (05:00 hrs) 24 Geomorphology : Rolling plain. The slide material flown towards N 230°. 25 Geology/Lithology : Charnockite 26 Structure : - 27 Landuse/ Landcover : Mixed cultivation 28 Hydrological condition : Dry 29 Triggering Factor : Heavy Rainfall 30 Death of persons : Nil 31 People affected : Nil 32 Livestock Loss : Nil 33 Communication : Nil 34 Infrastructure : One office building affected 35 Agriculture/forest/Barren : Nil 36 Geo-scientific Causes : Uns			:	
17 Type of movement : Rapid 18 Rate of movement : Rapid 19 Activity : Active 20 Distribution : Retrogressive 21 Style : Single 22 Failure mechanism : Shallow rotational (≤ 5m) failure 23 History : I4th June 2018 (05:00 hrs) 24 Geomorphology : Rolling plain. The slide material flown towards N 230th. 25 Geology/Lithology : Charnockite 26 Structure : - 27 Landuse/ Landcover : Mixed cultivation 28 Hydrological condition : Dry 29 Triggering Factor : Heavy Rainfall 30 Death of persons : Nil 31 People affected : Nil 32 Livestock Loss : Nil 33 Communication : Nil 34 Infrastructure : One office building affected 35 Agriculture/forest/Barren : Nil 36 Geo-scientific Causes : Unscientific slope modification and unprotected cut slope made for building construction. Inces	-		:	
18 Rate of movement : Rapid 19 Activity : Active 20 Distribution : Retrogressive 21 Style : Single 22 Failure mechanism : Shallow rotational (≤ 5m) failure 23 History : 14 th June 2018 (05:00 hrs) 24 Geomorphology : Rolling plain. The slide material flown towards N 230°. 25 Geology/Lithology : Charnockite 26 Structure : - 27 Landuse/ Landcover : Mixed cultivation 28 Hydrological condition : Dry 29 Triggering Factor : Heavy Rainfall 30 Death of persons : Nil 31 People affected : Nil 32 Livestock Loss : Nil 33 Communication : Nil 34 Infrastructure : One office building affected 35 Agriculture/forest/Barren : Nil 36 Geo-scientific Causes : Unscientific slope modification and unprotected cut slope made for building construction. Incessant rainfall is the triggering factor which resulted in the reduction of strength on satur			:	
19 Activity : Active 20 Distribution : Retrogressive 21 Style : Single 22 Failure mechanism : Shallow rotational (≤ 5m) failure 23 History : 14 th June 2018 (05:00 hrs) 24 Geomorphology : Rolling plain. The slide material flown towards N 230°. 25 Geology/Lithology : Charnockite 26 Structure : - 27 Landuse/ Landcover : Mixed cultivation 28 Hydrological condition : Dry 29 Triggering Factor : Heavy Rainfall 30 Death of persons : Nil 31 People affected : Nil 32 Livestock Loss : Nil 33 Communication : Nil 34 Infrastructure : One office building affected 35 Agriculture/forest/Barren : Nil 36 Geo-scientific Causes : Unscientific slope modification and unprotected cut slope made for building construction. Incessant rainfall is the triggering factor which resulted in the reduction of strength on saturation and increase in pore water pressure. 36 Remedial measures : The vertical cut may be protected with proper retaining wall with weep holes. 38 Remarks, if any : The landslide seems to be widening 39 Photos. Sketch of Plan & :			:	
20 Distribution : Retrogressive 21 Style : Single 22 Failure mechanism : Shallow rotational (≤ 5m) failure 23 History : 14 th June 2018 (05:00 hrs) 24 Geomorphology : Rolling plain. The slide material flown towards N 230 th . 25 Geology/Lithology : Charnockite 26 Structure :			:	*
21 Style : Single 22 Failure mechanism : Shallow rotational (≤ 5m) failure 23 History : 14 th June 2018 (05:00 hrs) 24 Geomorphology : Rolling plain. The slide material flown towards N 230°. 25 Geology/Lithology : Charnockite 26 Structure : - 27 Landuse/ Landcover : Mixed cultivation 28 Hydrological condition : Dry 29 Triggering Factor : Heavy Rainfall 30 Death of persons : Nil 31 People affected : Nil 32 Livestock Loss : Nil 33 Communication : Nil 34 Infrastructure : One office building affected 35 Agriculture/forest/Barren : Nil 36 Geo-scientific Causes : Unscientific slope modification and unprotected cut slope made for building construction. Incessant rainfall is the triggering factor which resulted in the reduction of strength on saturation and increase in pore water pressure. 36 Remedial measures : The vertical cut may be protected with proper retaining wall with weep holes. 38 Remarks, if any : The landslide seems to be widening 39 Photos. Sketch of Plan & :				
22 Failure mechanism : Shallow rotational (≤ 5m) failure 23 History : 14th June 2018 (05:00 hrs) 24 Geomorphology : Rolling plain. The slide material flown towards N 230°. 25 Geology/Lithology : Charnockite 26 Structure : - 27 Landuse/ Landcover : Mixed cultivation 28 Hydrological condition : Dry 29 Triggering Factor : Heavy Rainfall 30 Death of persons : Nil 31 People affected : Nil 32 Livestock Loss : Nil 33 Communication : Nil 34 Infrastructure : One office building affected 35 Agriculture/forest/Barren : Nil 36 Geo-scientific Causes : Unscientific slope modification and unprotected cut slope made for building construction. Incessant rainfall is the triggering factor which resulted in the reduction of strength on saturation and increase in pore water pressure. 36 Remedial measures : The vertical cut may be protected with proper retaining wall with weep holes. 38 Remarks, if any : The landslide seems to be widening 39 Photos. Sketch of Plan & :				Ü
23 History		•		
24 Geomorphology : Rolling plain. The slide material flown towards N 230°. 25 Geology/Lithology : Charnockite 26 Structure : - 27 Landuse/ Landcover : Mixed cultivation 28 Hydrological condition : Dry 29 Triggering Factor : Heavy Rainfall 30 Death of persons : Nil 31 People affected : Nil 32 Livestock Loss : Nil 33 Communication : Nil 34 Infrastructure : One office building affected 35 Agriculture/forest/Barren : Nil 36 Geo-scientific Causes : Unscientific slope modification and unprotected cut slope made for building construction. Incessant rainfall is the triggering factor which resulted in the reduction of strength on saturation and increase in pore water pressure. 37 Remedial measures : The vertical cut may be protected with proper retaining wall with weep holes. 38 Remarks, if any : The landslide seems to be widening 39 Photos. Sketch of Plan & :			4	
25 Geology/Lithology : Charnockite 26 Structure : - 27 Landuse/ Landcover : Mixed cultivation			-	
26 Structure : -			1.0	
27			- %	on Ve
29 Triggering Factor : Heavy Rainfall			:	Mixed cultivation
29 Triggering Factor : Heavy Rainfall	28	Hydrological condition		Dry
30 Death of persons : Nil				
31 People affected : Nil				
32 Livestock Loss ; Nil 33 Communication ; Nil 34 Infrastructure ; One office building affected 35 Agriculture/forest/Barren ; Nil 36 Geo-scientific Causes ; Unscientific slope modification and unprotected cut slope made for building construction. Incessant rainfall is the triggering factor which resulted in the reduction of strength on saturation and increase in pore water pressure. 37 Remedial measures ; The vertical cut may be protected with proper retaining wall with weep holes. 38 Remarks, if any ; The landslide seems to be widening 39 Photos. Sketch of Plan & ;			A	
33 Communication : Nil				
34			100	
35 Agriculture/forest/Barren : Nil 36 Geo-scientific Causes : Unscientific slope modification and unprotected cut slope made for building construction. Incessant rainfall is the triggering factor which resulted in the reduction of strength on saturation and increase in pore water pressure. 37 Remedial measures : The vertical cut may be protected with proper retaining wall with weep holes. 38 Remarks, if any : The landslide seems to be widening 39 Photos. Sketch of Plan & :				DEPOT DESCRIPTION OF THE PROPERTY OF THE PROPE
Geo-scientific Causes : Unscientific slope modification and unprotected cut slope made for building construction. Incessant rainfall is the triggering factor which resulted in the reduction of strength on saturation and increase in pore water pressure. 37 Remedial measures : The vertical cut may be protected with proper retaining wall with weep holes. 38 Remarks, if any : The landslide seems to be widening 39 Photos. Sketch of Plan & :			10	
made for building construction. Incessant rainfall is the triggering factor which resulted in the reduction of strength on saturation and increase in pore water pressure. 37 Remedial measures : The vertical cut may be protected with proper retaining wall with weep holes. 38 Remarks, if any : The landslide seems to be widening 39 Photos. Sketch of Plan & :			- 10	ST ST LONG VIEW
triggering factor which resulted in the reduction of strength on saturation and increase in pore water pressure. The vertical cut may be protected with proper retaining wall with weep holes. Remarks, if any : The landslide seems to be widening Photos. Sketch of Plan & :	30	Geo scientific causes	•	
on saturation and increase in pore water pressure. The vertical cut may be protected with proper retaining wall with weep holes. Remarks, if any : The landslide seems to be widening Photos. Sketch of Plan & :				
37 Remedial measures : The vertical cut may be protected with proper retaining wall with weep holes. 38 Remarks, if any : The landslide seems to be widening 39 Photos. Sketch of Plan & :			1	Land Control of the C
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38 Remarks, if any : The landslide seems to be widening 39 Photos. Sketch of Plan & :				
39 Photos. Sketch of Plan & :	38	Remarks, if any		
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		section of the slide	P	
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40	Summary/Abstract	:	On 14 th June 2018, an earth slide occurred in the compound of Jawahar Vidhya Nagar school. The important causes include unscientific slope modification for building construction. Incessant rainfall resulted in the reduction of strength on saturation and increase in pore water pressure. Proper retaining structures may be provided.
41	Date of Reporting	:	04/07/2018
42	Landslide Category	:	Category III
	Slide-30:	<u>}</u>	

No	Field		Description
1	Slide No.	1	KER/WYD/58A2/2018/03
2	State	:	Kerala
3	District		Wayanad
4	Toposheet No.	Ų,	58 A/2
5	Name of the slide	: 7,	Veterinary College Landslide
6	NH/SH/Locality	:-	Vythiri – Kalpetta road
7	Latitude		11.5346
8	Longitude	/	76.0244
9	Length	1	22 m
10	Width	7	8 m
11	Height	1.1	18 m
12	Area		176m^2
13	Depth		1 m
14	Volume	Ä	$176 \mathrm{m}^3$
15	Runout distance	-	
16	Type of Material	:	Debris
17	Type of movement	:	Slide
18	Rate of movement	:	Rapid
19	Activity		Reactivated (occurred earlier in 2009)
20	Distribution	:	Retrogressive / widening
21	Style	:	Single
22	Failure mechanism	:	Shallow rotational (≤ 5m) failure

24 Geomorphology Charnockite Charnoc	
25 Geology/Lithology : Charnockite	
27	
28	
29 Triggering Factor : Heavy Rainfall	-
29 Triggering Factor : Heavy Rainfall	
30 Death of persons : Nil	
31 People affected : Nil	
32 Livestock Loss : Nil	
33 Communication : Nil	
34	
35 Agriculture/forest/Barren : Nil 36 Geo-scientific Causes : Unscientific slope modification and unprotected cut sl made for building construction. Incessant rainfall is triggering factor which resulted in the reduction of stren on saturation and increase in pore water pressure. 37 Remedial measures : Easing of slope. Proper retaining structures with weep he may be provided at the cut surfaces. Ground cracks are to treated in order to avoid percolation of water. 38 Remarks, if any : Ground cracks were developed at the hostel location 39 Photos. Sketch of Plan & :	
36 Geo-scientific Causes : Unscientific slope modification and unprotected cut sl made for building construction. Incessant rainfall is triggering factor which resulted in the reduction of strent on saturation and increase in pore water pressure. 37 Remedial measures : Easing of slope. Proper retaining structures with weep had may be provided at the cut surfaces. Ground cracks are to treated in order to avoid percolation of water. 38 Remarks, if any : Ground cracks were developed at the hostel location 39 Photos. Sketch of Plan & :	
made for building construction. Incessant rainfall is triggering factor which resulted in the reduction of strength on saturation and increase in pore water pressure. 37 Remedial measures : Easing of slope. Proper retaining structures with weep he may be provided at the cut surfaces. Ground cracks are to treated in order to avoid percolation of water. 38 Remarks, if any : Ground cracks were developed at the hostel location 39 Photos. Sketch of Plan & :	ope
triggering factor which resulted in the reduction of strength on saturation and increase in pore water pressure. 37 Remedial measures : Easing of slope. Proper retaining structures with weep he may be provided at the cut surfaces. Ground cracks are to treated in order to avoid percolation of water. 38 Remarks, if any : Ground cracks were developed at the hostel location 39 Photos. Sketch of Plan & :	_
on saturation and increase in pore water pressure. Easing of slope. Proper retaining structures with weep he may be provided at the cut surfaces. Ground cracks are to treated in order to avoid percolation of water. Remarks, if any : Ground cracks were developed at the hostel location Photos. Sketch of Plan & :	
37 Remedial measures : Easing of slope. Proper retaining structures with weep he may be provided at the cut surfaces. Ground cracks are to treated in order to avoid percolation of water. 38 Remarks, if any : Ground cracks were developed at the hostel location 39 Photos. Sketch of Plan & :	0
may be provided at the cut surfaces. Ground cracks are to treated in order to avoid percolation of water. 38 Remarks, if any : Ground cracks were developed at the hostel location 39 Photos. Sketch of Plan & :	oles
treated in order to avoid percolation of water. Remarks, if any : Ground cracks were developed at the hostel location Photos. Sketch of Plan & :	
39 Photos. Sketch of Plan & :	
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40 Summary/Abstract : A debris slide was occurred on 14 th June 2018 at	
Veterinary College, Vythiri. The main cause is the unscient	the

			slope modification for building construction. Remedial measures include easing of slope, provision of proper retaining structures.
41	Date of Reporting	:	04/07/2018
42	Landslide Category	:	Category III

Slide-31:

		Slide-31:		
2	No			Description
3 District : Wayanad 4 Toposheet No. : 58 AZ 5 Name of the slide : Achoor (6 th mile) Landslide 6 NH/SH/Locality : Vythiri − Padinjarathara road 7 Latitude : 11.6066 8 Longitude : 76.0077 9 Length : 20 m 10 Width : 45 m 11 Height : 15 m 12 Area : 900 m² 13 Depth : 1.5 m 14 Volume : 1350 m² 15 Runout distance : Upto the house at the bench below 16 Type of Material : Soil 17 Type of movement : Slide 18 Rate of movement : Very Rapid 19 Activity : Active 20 Distribution : Retrogressive 21 Style : Single 22 Failure mechanism : Shallow rotational (≤5m) failure 23 History : 14 th June 2018 (08:30 hrs) 24 Geomorphology : Rolling plain. The slide material flown towards № 270°. 25 Geology/Lithology : Schistose rock 26 Structure : ✓ 27 Landuse / Landcover : Mixed cultivation 28 Hydrological condition : Dry 29 Triggering Factor : Heavy Rainfall 30 Death of persons : 1 No. 31 People affected : 1 No. 32 Livestock Loss : Nil 34 Infrastructure : One house fully and one house partially damaged 35 Agriculture/forest/Barren : Agricultural land 36 Geo-scientific Causes : Unscientific slope modification and unprotected vertical cu	1	Slide No.		KER/WYD/58A2/2018/04
4 Toposheet No. : 58 A/2 5 Name of the slide : Achoor (6 th mile) Landslide 6 NH/SH/Locality : Vythiri - Padinjarathara road 7 Latitude : 17.0066 8 Longitude : 76.0077 9 Length : 20 m 10 Width : 45 m 11 Height : 15 m 12 Area : 900 m² 13 Depth : 1.5 m 14 Volume : 1350 m² 15 Runout distance : Upto the house at the bench below 16 Type of Material : Soil 17 Type of movement : Slide 18 Rate of movement : Very Rapid 19 Activity : Active 20 Distribution : Retrogressive 21 Style : Single 22 Failure mechanism : Shallow rotational (≤5m) failure 23 History : 14 th June 2018 (08:30 hrs) 24 Geomorphology : Rolling plain. The slide material flown towards N 270°. 25 Geology/Lithology : Schistose rock 26 Structure : - 27 Landuse / Landcover : Mixed cultivation 28 Hydrological condition : Dry 29 Triggering Factor : Heavy Rainfall 30 Death of persons : I No. 31 People affected : I No. 32 Livestock Loss : Nil 33 Communication : Nil 34 Infrastructure : - 35 Agriculture/forest/Barren : Agricultural land 36 Geo-scientific Causes : Unscientific slope modification and unprotected vertical cultivation 1 Infrastructure : - 1 Agricultural land 36 Geo-scientific Causes : Unscientific slope modification and unprotected vertical cultivation				Kerala
5 Name of the slide : Achoor (6 th mile) Landslide 6 NH/SH/Locality : Vythiri - Padinjarathara road 7 Latitude : 11.6066 8 Longitude : 76.0077 9 Length : 20 m 10 Width : 45 m 11 Height : 15 m 12 Area : 900 m² 13 Depth : 1.5 m 14 Volume : 1350 m² 15 Runout distance : Upto the house at the bench below 16 Type of Material : Soil 17 Type of movement : Slide 18 Rate of movement : Very Rapid 19 Activity : Active 20 Distribution : Retrogressive 21 Style : Single 22 Failure mechanism : Shallow rotational (≤ 5m) failure 23 History : 14th June 2018 (08:30 hrs) 24 Geomorphology : Rolling plain. The slide material flown towards N 270th Schistose rock 25 Geology/Lithology : Schistose rock	3	District		Wayanad
6 NH/SH/Locality : Vythiri – Padinjarathara road 7 Latitude : 11.6066 8 Longitude : 76.0077 9 Length : 20 m 10 Width : 45 m 11 Height : 1.5 m 12 Area : 900 m² 13 Depth : 1.5 m 14 Volume : 1350 m² 15 Runout distance : Upto the house at the bench below 16 Type of Material : Soil 17 Type of movement : Slide 18 Rate of movement : Very Rapid 19 Activity : Active 20 Distribution : Retrogressive 21 Style : Single 22 Failure mechanism : Shallow rotational (≤ 5m) failure 23 History : Active 24 Geomorphology : Rolling plain. The slide material flown towards N 270°. 25 Geology/Lithology : Schistose rock 26 St	4	Toposheet No.		
7 Latitude : 11.6066 8 Longitude : 76.0077 9 Length : 20 m 10 Width : 45 m 11 Height : 15 m 12 Area : 900 m² 13 Depth : 1.5 m 14 Volume : 1350 m² 15 Runout distance : Upto the house at the bench below 16 Type of Material : Soil 17 Type of movement : Slide 18 Rate of movement : Very Rapid 19 Activity : Active 20 Distribution : Retrogressive 21 Style : Single 22 Failure mechanism : Shallow rotational (≤ 5m) failure 23 History : I4³ June 2018 (08:30 hrs) 24 Geomorphology : Rolling plain. The slide material flown towards N 270°. 25 Geology/Lithology : Schistose rock 26 Structure : 27 Landuse / Landcove	5	Name of the slide	:	Achoor (6 th mile) Landslide
8	6	NH/SH/Locality		Vythiri – Padinjarathara road
9 Length	7	Latitude	:	11.6066
10 Width	8	Longitude	:	76.0077
11 Height : 15 m 12 Area : 900 m² 13 Depth : 1.5 m 14 Volume : 1350 m² 15 Runout distance : Upto the house at the bench below 16 Type of Material : Soil 17 Type of movement : Slide 18 Rate of movement : Very Rapid 19 Activity : Active 20 Distribution : Retrogressive 21 Style : Single 22 Failure mechanism : Shallow rotational (≤5m) failure 23 History : I4th June 2018 (08:30 hrs) 24 Geomorphology : Rolling plain. The slide material flown towards N 270°. 25 Geology/Lithology : Schistose rock 26 Structure : - 27 Landuse / Landcover : Mixed cultivation 28 Hydrological condition : Dry 29 Triggering Factor : Heavy Rainfall 30 Death of persons : Ino. 31 People affected : Ino.	9	Length	:	20 m
12	10	Width	:	45 m
13 Depth : 1.5 m 14 Volume : 1350 m² 15 Runout distance : Upto the house at the bench below 16 Type of Material : Soil 17 Type of movement : Slide 18 Rate of movement : Very Rapid 19 Activity : Active 20 Distribution : Retrogressive 21 Style : Single 22 Failure mechanism : Shallow rotational (≤ 5m) failure 23 History : 14th June 2018 (08:30 hrs) 24 Geomorphology : Rolling plain. The slide material flown towards N 270th 27th 27th 27th 27th 27th 27th 27th 27	11	Height	:	15 m
14 Volume : 1350 m³ 15 Runout distance : Upto the house at the bench below 16 Type of Material : Soil 17 Type of movement : Slide 18 Rate of movement : Very Rapid 19 Activity : Active 20 Distribution : Retrogressive 21 Style : Single 22 Failure mechanism : Shallow rotational (≤5m) failure 23 History : I4th June 2018 (08:30 hrs) 24 Geomorphology : Rolling plain. The slide material flown towards N 270°. 25 Geology/Lithology : Schistose rock 26 Structure :	12	Area	:	$900 m^2$
15 Runout distance : Upto the house at the bench below 16 Type of Material : Soil 17 Type of movement : Slide 18 Rate of movement : Very Rapid 19 Activity : Active 20 Distribution : Retrogressive 21 Style : Single 22 Failure mechanism : Shallow rotational (≤ 5m) failure 23 History : I4th June 2018 (08:30 hrs) 24 Geomorphology : Rolling plain. The slide material flown towards N 270°. 25 Geology/Lithology : Schistose rock 26 Structure : - 27 Landuse / Landcover : Mixed cultivation 28 Hydrological condition : Dry 29 Triggering Factor : Heavy Rainfall 30 Death of persons : I No. 31 People affected : I No. 32 Livestock Loss : Nil 33 Communication : Nil 34 Infrastructure : One house fully and one house partially damaged 35	13	Depth	:	1.5 m
16 Type of Material : Soil 17 Type of movement : Slide 18 Rate of movement : Very Rapid 19 Activity : Active 20 Distribution : Retrogressive 21 Style : Single 22 Failure mechanism : Shallow rotational (≤ 5m) failure 23 History : I4th June 2018 (08:30 hrs) 24 Geomorphology : Rolling plain. The slide material flown towards N 270°. 25 Geology/Lithology : Schistose rock 26 Structure : - 27 Landuse / Landcover : Mixed cultivation 28 Hydrological condition : Dry 29 Triggering Factor : Heavy Rainfall 30 Death of persons : I No. 31 People affected : I No. 32 Livestock Loss : Nil 33 Communication : Nil 34 Infrastructure : One house fully and one house partially damaged 35 Agriculture/forest/Barren : Agricultural land 36 <t< td=""><td>14</td><td>Volume</td><td>:</td><td>$1350 m^3$</td></t<>	14	Volume	:	$1350 m^3$
17 Type of movement : Slide 18 Rate of movement : Very Rapid 19 Activity : Active 20 Distribution : Retrogressive 21 Style : Single 22 Failure mechanism : Shallow rotational (≤5m) failure 23 History : I4th June 2018 (08:30 hrs) 24 Geomorphology : Rolling plain. The slide material flown towards N 270°. 25 Geology/Lithology : Schistose rock 26 Structure : - 27 Landuse / Landcover : Mixed cultivation 28 Hydrological condition : Dry 29 Triggering Factor : Heavy Rainfall 30 Death of persons : I No. 31 People affected : I No. 32 Livestock Loss : Nil 33 Communication : Nil 34 Infrastructure : One house fully and one house partially damaged 35 Agriculture/forest/Barren : Agricultural land 36 Geo-scientific Causes : Unscientific slope modification and unprotected ver	15	Runout distance	:	Upto the house at the bench below
18 Rate of movement : Very Rapid 19 Activity : Active 20 Distribution : Retrogressive 21 Style : Single 22 Failure mechanism : Shallow rotational (≤ 5m) failure 23 History : 14th June 2018 (08:30 hrs) 24 Geomorphology : Rolling plain. The slide material flown towards N 270°. 25 Geology/Lithology : Schistose rock 26 Structure :	16	Type of Material	×.	Soil
19	17	Type of movement	1	Slide
20 Distribution : Retrogressive	18	Rate of movement	1	Very Rapid
21 Style : Single 22 Failure mechanism : Shallow rotational (≤5m) failure 23 History : 14th June 2018 (08:30 hrs) 24 Geomorphology : Rolling plain. The slide material flown towards N 270th. 25 Geology/Lithology : Schistose rock 26 Structure : - 27 Landuse / Landcover : Mixed cultivation 28 Hydrological condition : Dry 29 Triggering Factor : Heavy Rainfall 30 Death of persons : I No. 31 People affected : I No. 32 Livestock Loss : Nil 33 Communication : Nil 34 Infrastructure : One house fully and one house partially damaged 35 Agriculture/forest/Barren : Agricultural land 36 Geo-scientific Causes : Unscientific slope modification and unprotected vertical cut	19	Activity	1	Active
22 Failure mechanism : Shallow rotational (≤ 5m) failure	20	Distribution	:	Retrogressive
23 History : 14th June 2018 (08:30 hrs) 24 Geomorphology : Rolling plain. The slide material flown towards N 270°. 25 Geology/Lithology : Schistose rock 26 Structure : - 27 Landuse / Landcover : Mixed cultivation 28 Hydrological condition : Dry 29 Triggering Factor : Heavy Rainfall 30 Death of persons : 1 No. 31 People affected : 1 No. 32 Livestock Loss : Nil 33 Communication : Nil 34 Infrastructure : One house fully and one house partially damaged 35 Agriculture/forest/Barren : Agricultural land 36 Geo-scientific Causes : Unscientific slope modification and unprotected vertical cultivarial land	21	Style	1	Single
Geology/Lithology : Rolling plain. The slide material flown towards N 270°.	22	Failure mechanism	٠.,	
Schistose rock Structure Schistose rock Structure Struct	23	History	1	14 th June 2018 (08:30 hrs)
26 Structure : - -	24	Geomorphology	:	Rolling plain. The slide material flown towards N 270°.
26 Structure :	25	Geology/Lithology		Schistose rock
28 Hydrological condition : Dry 29 Triggering Factor : Heavy Rainfall 30 Death of persons : I No. 31 People affected : I No. 32 Livestock Loss : Nil 33 Communication : Nil 34 Infrastructure : One house fully and one house partially damaged 35 Agriculture/forest/Barren : Agricultural land 36 Geo-scientific Causes : Unscientific slope modification and unprotected vertical cut	26		1	/ //////
29 Triggering Factor : Heavy Rainfall 30 Death of persons : I No. 31 People affected : I No. 32 Livestock Loss : Nil 33 Communication : Nil 34 Infrastructure : One house fully and one house partially damaged 35 Agriculture/forest/Barren : Agricultural land 36 Geo-scientific Causes : Unscientific slope modification and unprotected vertical cut	27	Landuse / Landcover	1	Mixed cultivation
30 Death of persons : I No.	28	Hydrological condition		Dry
30 Death of persons : I No.	29	Triggering Factor	1	Heavy Rainfall
31 People affected : I No. 32 Livestock Loss : Nil 33 Communication : Nil 34 Infrastructure : One house fully and one house partially damaged 35 Agriculture/forest/Barren : Agricultural land 36 Geo-scientific Causes : Unscientific slope modification and unprotected vertical cut	30		M	
33 Communication : Nil 34 Infrastructure : One house fully and one house partially damaged 35 Agriculture/forest/Barren : Agricultural land 36 Geo-scientific Causes : Unscientific slope modification and unprotected vertical cut	31	People affected		
34 Infrastructure : One house fully and one house partially damaged 35 Agriculture/forest/Barren : Agricultural land 36 Geo-scientific Causes : Unscientific slope modification and unprotected vertical cut	32	Livestock Loss	1	Nil
35 Agriculture/forest/Barren : Agricultural land	33	Communication	:	Nil
36 Geo-scientific Causes : Unscientific slope modification and unprotected vertical cu	34	Infrastructure	:	One house fully and one house partially damaged
36 Geo-scientific Causes : Unscientific slope modification and unprotected vertical cu	35	Agriculture/forest/Barren	:	Agricultural land
	36		:	Unscientific slope modification and unprotected vertical cut
slope made for house construction. Incessant rainfall is the				slope made for house construction. Incessant rainfall is the
triggering factor which resulted in the reduction of strength				triggering factor which resulted in the reduction of strength
on saturation and increase in pore water pressure.				on saturation and increase in pore water pressure.

37	Remedial measures	:	Easing of slope with benches. The vertical cut may be protected with proper retaining wall with weep holes.
38	Remarks, if any	:	The houses at this location are built with vertical cut without any retaining wall. Weathered rock patch is also observed along the slide zone
39	Photos. Sketch of Plan & section of the slide		
40	Summary/Abstract		An earth slide was occurred on 14 th June 2018 at Achoor, Vythiri resulted in the death of one person and damage to house. The important causes include (a) Unscientific slope modification and unprotected vertical cut slope made for house construction and (b) Incessant rainfall is the triggering factor which resulted in the reduction of strength on saturation and increase in pore water pressure. Remedial measures include (a) Easing of slope with benches and (b) The vertical cut may be protected with proper retaining wall with weep holes.
41	Date of Reporting	7.	04/07/2018
42	Landslide Category	3	Category II

Slide-32:

No	Field		Description
1	Slide No.	:	KER/WYD/49M14/2018/05
2	State	1	Kerala
3	District	15	Wayanad
4	Toposheet No.	H	49 M/14
5	Name of the slide	11	Valaramkunnu Landslide
6	NH/SH/Locality	Н	Mananthavady – Niravilpuzha road
7	Latitude		11.6941
8	Longitude	••	75.9371
9	Length	••	15 m
10	Width	••	8 m
11	Height	:	10 m
12	Area	••	$120 m^2$
13	Depth	:	0.5 m

14	Volume		60m^3
15	Runout distance		350 m
16	Type of Material		Debris Debris
17	Type of movement		Slide
18	Rate of movement		Very Rapid
			Active
19	Activity		
20	Distribution	:	Retrogressive
21	Style	100	Single
22	Failure mechanism	2	Shallow rotational ($\leq 5m$) failure
23	History	1	14 th June 2018 (08:00 hrs)
24	Geomorphology		Lowly dissected slope. The slide material flown towards N 35°.
25	Geology/Lithology		Charnockite gneiss
26	Structure	:	South C'
27	Landuse/ Landcover	ji.	Mixed cultivation
28	Hydrological condition	:	Dry
29	Triggering Factor	:	Heavy Rainfall
30	Death of persons	:	Nil
31	People affected	:	Nil
32	Livestock Loss	: 1	Nil
33	Communication	:	Road damaged
34	Infrastructure	:	Nil
35	Agriculture/forest/Barren	:	Nil
	Geo-scientific Causes	١.	Unscientific slope modification and unprotected cut slope
1.50	Geo-scientific Causes		i Onscientitic stone modification and amprofected cat stone i
36	Geo-scientific Causes	<u></u>	
30	Geo-scientific Causes		made for road construction. Incessant rainfall is the
30	Geo-scientific Causes		made for road construction. Incessant rainfall is the triggering factor which resulted in the reduction of strength
	H H H		made for road construction. Incessant rainfall is the triggering factor which resulted in the reduction of strength on saturation and increase in pore water pressure.
37	Remedial measures		made for road construction. Incessant rainfall is the triggering factor which resulted in the reduction of strength on saturation and increase in pore water pressure. Toe support with proper drainage conduits may be provided.
	H H H		made for road construction. Incessant rainfall is the triggering factor which resulted in the reduction of strength on saturation and increase in pore water pressure. Toe support with proper drainage conduits may be provided. Radial cracks are to be treated in order to avoid percolation
37	Remedial measures		made for road construction. Incessant rainfall is the triggering factor which resulted in the reduction of strength on saturation and increase in pore water pressure. Toe support with proper drainage conduits may be provided. Radial cracks are to be treated in order to avoid percolation of water.
	H H H	1 X	made for road construction. Incessant rainfall is the triggering factor which resulted in the reduction of strength on saturation and increase in pore water pressure. Toe support with proper drainage conduits may be provided. Radial cracks are to be treated in order to avoid percolation of water. Radial cracks developed on the upslope area. Debris material
37	Remedial measures Remarks, if any	X AX	made for road construction. Incessant rainfall is the triggering factor which resulted in the reduction of strength on saturation and increase in pore water pressure. Toe support with proper drainage conduits may be provided. Radial cracks are to be treated in order to avoid percolation of water.
37	Remedial measures Remarks, if any Photos. Sketch of Plan &	X 1X	made for road construction. Incessant rainfall is the triggering factor which resulted in the reduction of strength on saturation and increase in pore water pressure. Toe support with proper drainage conduits may be provided. Radial cracks are to be treated in order to avoid percolation of water. Radial cracks developed on the upslope area. Debris material
37	Remedial measures Remarks, if any		made for road construction. Incessant rainfall is the triggering factor which resulted in the reduction of strength on saturation and increase in pore water pressure. Toe support with proper drainage conduits may be provided. Radial cracks are to be treated in order to avoid percolation of water. Radial cracks developed on the upslope area. Debris material
37	Remedial measures Remarks, if any Photos. Sketch of Plan &	2 N N N	made for road construction. Incessant rainfall is the triggering factor which resulted in the reduction of strength on saturation and increase in pore water pressure. Toe support with proper drainage conduits may be provided. Radial cracks are to be treated in order to avoid percolation of water. Radial cracks developed on the upslope area. Debris material
37	Remedial measures Remarks, if any Photos. Sketch of Plan &		made for road construction. Incessant rainfall is the triggering factor which resulted in the reduction of strength on saturation and increase in pore water pressure. Toe support with proper drainage conduits may be provided. Radial cracks are to be treated in order to avoid percolation of water. Radial cracks developed on the upslope area. Debris material
37	Remedial measures Remarks, if any Photos. Sketch of Plan &		made for road construction. Incessant rainfall is the triggering factor which resulted in the reduction of strength on saturation and increase in pore water pressure. Toe support with proper drainage conduits may be provided. Radial cracks are to be treated in order to avoid percolation of water. Radial cracks developed on the upslope area. Debris material
37	Remedial measures Remarks, if any Photos. Sketch of Plan &		made for road construction. Incessant rainfall is the triggering factor which resulted in the reduction of strength on saturation and increase in pore water pressure. Toe support with proper drainage conduits may be provided. Radial cracks are to be treated in order to avoid percolation of water. Radial cracks developed on the upslope area. Debris material
37	Remedial measures Remarks, if any Photos. Sketch of Plan &		made for road construction. Incessant rainfall is the triggering factor which resulted in the reduction of strength on saturation and increase in pore water pressure. Toe support with proper drainage conduits may be provided. Radial cracks are to be treated in order to avoid percolation of water. Radial cracks developed on the upslope area. Debris material
37	Remedial measures Remarks, if any Photos. Sketch of Plan &		made for road construction. Incessant rainfall is the triggering factor which resulted in the reduction of strength on saturation and increase in pore water pressure. Toe support with proper drainage conduits may be provided. Radial cracks are to be treated in order to avoid percolation of water. Radial cracks developed on the upslope area. Debris material
37	Remedial measures Remarks, if any Photos. Sketch of Plan &		made for road construction. Incessant rainfall is the triggering factor which resulted in the reduction of strength on saturation and increase in pore water pressure. Toe support with proper drainage conduits may be provided. Radial cracks are to be treated in order to avoid percolation of water. Radial cracks developed on the upslope area. Debris material
37	Remedial measures Remarks, if any Photos. Sketch of Plan &		made for road construction. Incessant rainfall is the triggering factor which resulted in the reduction of strength on saturation and increase in pore water pressure. Toe support with proper drainage conduits may be provided. Radial cracks are to be treated in order to avoid percolation of water. Radial cracks developed on the upslope area. Debris material
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37	Remedial measures Remarks, if any Photos. Sketch of Plan &		made for road construction. Incessant rainfall is the triggering factor which resulted in the reduction of strength on saturation and increase in pore water pressure. Toe support with proper drainage conduits may be provided. Radial cracks are to be treated in order to avoid percolation of water. Radial cracks developed on the upslope area. Debris material
37	Remedial measures Remarks, if any Photos. Sketch of Plan &		made for road construction. Incessant rainfall is the triggering factor which resulted in the reduction of strength on saturation and increase in pore water pressure. Toe support with proper drainage conduits may be provided. Radial cracks are to be treated in order to avoid percolation of water. Radial cracks developed on the upslope area. Debris material
37	Remedial measures Remarks, if any Photos. Sketch of Plan &		made for road construction. Incessant rainfall is the triggering factor which resulted in the reduction of strength on saturation and increase in pore water pressure. Toe support with proper drainage conduits may be provided. Radial cracks are to be treated in order to avoid percolation of water. Radial cracks developed on the upslope area. Debris material

40	Summary/Abstract :	A debris slide was occurred on 14 th June 2018 at Valaramkunnu. Radial cracks developed on the upslope area. Debris material has reached up to nursery school downslope The main causes include (a) Unscientific slope modification and unprotected cut slope made for road construction and (b) Incessant rainfall is the triggering factor which resulted in the reduction of strength on saturation and increase in pore water pressure. Remedial measures include (a) Toe support with proper drainage conduits may be provided and (b) Radial cracks are to be treated in order to avoid percolation of water.
41	Date of Reporting :	04/07/2018
42	Landslide Category :	Category III

Slide-33:

No	Field		Description
1	Slide No.	1/2	KER/WYD/49M14/2018/06
2	State	1	Kerala
3	District	1	Wayanad
4	Toposheet No.	:	49 M/14
5	Name of the slide	:	Veetikunnu Landslide
6	NH/SH/Locality		Mananthavady – Niravilpuzha road
7	Latitude	1.2	11.7013
8	Longitude	77	75.9359)
9	Length		70 m
10	Width		12 m
11	Height	:	45 m
12	Area	:	$840 m^2$
13	Depth	:	6 m
14	Volume	:	5040 m^3
15	Runout distance	:	Upto the house at the downslope
16	Type of Material	:	Rock cum Debris
17	Type of movement	:	Slide

18	Rate of movement	:	Very Rapid
19	Activity	:	Reactivated
20	Distribution	:	Retrogressive
21	Style	:	Single
22	Failure mechanism	:	Deep rotational (≥ 5m) failure
23	History	:	14 th June 2018 (10:00 hrs)
24	Geomorphology	:	Moderately dissected slope. The debris material flown
		and the	towards N 355°.
25	Geology/Lithology		Charnockite gneiss
26	Structure		でのここの人
27	Landuse/ Landcover	3	Mixed cultivation
28	Hydrological condition	-	Dry
29	Triggering Factor	:	Heavy Rainfall
30	Death of persons	:	Nil
31	People affected	4.	Nil
32	Livestock Loss	:	Nil
33	Communication	:	Nil
34	Infrastructure	:	One house damaged
35	Agriculture/forest/Barren	:	Agricultural land damaged
36	Geo-scientific Causes	: 1	Incessant rainfall is the triggering factor which resulted in the
	1/2//0		reduction of strength on saturation and increase in pore
	7		water pressure.
37	Remedial measures	:	Precarious boulders along the slide path have to be removed.
			Ensure free flow of water along the hill slopes. Avoid
			construction of dwelling units in the vicinity of the flow path.
38	Remarks, if any	7/	A number of rock boulders fallen along with this slide
	10 5	100	destroyed the house at the downslope side. Three precarious
		, and	boulders are present in the crown area and three huge
	1	6	boulders already detached from the crown are also lying
		1	along the flow path. This location seems to be an old slide
		1	(Palaeoslide) area which activated during the recent rain.
		- 5	Locals reported that during rainy season, water drains
	1.71		through this palaeoslide location. The two boulders lying
	1/1/1/1		near the toe portion is having a dimension of L x W x H as 6
1	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1	$m \times 3m \times 2.5m$ and $3.5 \times m \times 3 \times m \times 2 \times m$ respectively.

39	Photos. Sketch of Plan & section of the slide		
40	Summary/Abstract		A rock cum debris slide was occurred on 14 th June 2018 at Veetikunnu which resulted in the damage to one house. Incessant rainfall is the triggering factor which resulted in the reduction of strength on saturation and increase in pore water pressure. Remedial measures include removal of precarious boulders along the slide path and ensure free flow of water along the hill slopes. Avoid construction of dwelling units in the vicinity of the flow path.
41	Date of Reporting	100	04/07/2018
42	Landslide Category	1 1	Category II

Slide-34:

No	Field		Description
1	Slide No.	:	KER/WYD/49M14/2018/07
2	State	:	Kerala
3	District	:	Wayanad
4	Toposheet No.	:	49 M/14
5	Name of the slide	:	Pulipparakunnu Landslide

6	NH/SH/Locality	:	Mananthavady – Niravilpuzha road
7	Latitude	:	11.7034
8	Longitude	:	75.9369
9	Length	:	25 m
10	Width	:	12 m
11	Height	:	18 m
12	Area	:	300m^2
13	Depth		4 m
14	Volume	3	1200 m^3
15	Runout distance	1	Upto the nala below (~250 m)
16	Type of Material		Debris
17	Type of movement		Flow
18	Rate of movement	:	Rapid
19	Activity	:	Reactivated
20	Distribution	, ii	Retrogressive
21	Style	:	Successive
22	Failure mechanism	:	Shallow rotational (≤ 5m) failure
23	History	:	14 th June 2018
24	Geomorphology	:	Lowly dissected slope. Upslope is steeply sloping (escarpment). The debris material flown towards N 175°.
25	Geology/Lithology	:	Charnockite gneiss
26	Structure	:	
27	Landuse/ Landcover	:	Mixed cultivation
28	Hydrological condition	:	Dry
29	Triggering Factor		Heavy Rainfall
30	Death of persons	7/	Nil
31	People affected	1	Nil
32	Livestock Loss	-	Nil
33	Communication	K	Nil
34	Infrastructure	7:	Nil
35	Agriculture/forest/Barren	Y	Agricultural land damaged
36	Geo-scientific Causes	r C	Landslide initiated at the contact between rock and overburden in the form of debris slide and then transformed in to debris flow. Excessive rainfall is the triggering factor which resulted in the reduction of strength on saturation and increase in pore water pressure.
37	Remedial measures		Precarious boulders along the debris flow path have to be removed. The natural flow of water should not be blocked along the nala.
38	Remarks, if any		Adjacent to this landslide another landslide with similar properties was observed.

39	Photos. Sketch of Plan & section of the slide	
40	Summary/Abstract	: A successive landslide occurred on 14 th June 2018 at Pulipparakunnu. The landslide initiated at the contact between rock and overburden in the form of debris slide and then transformed in to debris flow. Excessive rainfall is the triggering factor which resulted in the reduction of strength on saturation and increase in pore water pressure. Precarious boulders along the debris flow path have to be removed. The natural flow of water should not be blocked along the nala.
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41	Date of Reporting	: 04/07/2018

Slide-35:

No	Field		Description
1	Slide No.	:	KER/WYD/49M13/2018/08
2	State	:	Kerala
3	District	:	Wayanad
4	Toposheet No.	:	49 M/13

5	Name of the slide	:	Thazhe Kunnothmala Landslide
6	NH/SH/Locality	:	Valad - Kunnothmala road
7	Latitude	:	11.8297
8	Longitude	:	75.9298
9	Length	:	25 m
10	Width	:	40 m
11	Height	:	18 m
12	Area		1000 m^2
13	Depth	Ó	3 m
14	Volume	P	$3000 m^3$
15	Runout distance	S	Upto the road level
16	Type of Material		Debris
17	Type of movement		Slide
18	Rate of movement	:	Rapid
19	Activity	ji.	Active
20	Distribution	:	Retrogressive
21	Style	:	Single
22	Failure mechanism	:	Shallow rotational (≤ 5m) failure
23	History	:	14 th June 2018
24	Geomorphology	: 1	Lowly dissected slope. The debris material flown towards N
	16/10		105°
25	Geology/Lithology	••	Schistose/Phyllitic
26	Structure	••	
27	Landuse/ Landcover	:	Mixed vegetation
28	Hydrological condition	Ž.	Dry
29	Triggering Factor	7	Heavy Rainfall
30	Death of persons	100	Nil
31	People affected	1	Nil
32	Livestock Loss	K.	Nil
33	Communication	7.	Valad - Kunnothmala road
34	Infrastructure	Y	Nil
35	Agriculture/forest/Barren	-	Agricultural land damaged
36	Geo-scientific Causes	:	Unscientific slope modification and unprotected cut slope
	1/1/1/1	1	made for road construction. Excessive rainfall is the
	16541139		triggering factor which resulted in the reduction of strength
			on saturation and increase in pore water pressure.
37	Remedial measures	-	Retaining structures with proper drainage outlet has to be
	12.15.	1	provided. Crown cracks are to be treated to avoid percolation
	15-		of water through it.
38	Remarks, if any		Crown cracks are developed which may activate the slide in
		_	future.

39	Photos. Sketch of Plan & section of the slide	
40	Summary/Abstract	: A debris slide was occurred on 14th June 2018 at Thazhe Kunnothumala along Valad-Kunnathumala road. Crown cracks are developed which may activate the slide in future. The important causes include (a) Unscientific slope modification and unprotected cut slope made for road construction and (b) Excessive rainfall is the triggering factor which resulted in the reduction of strength on saturation and increase in pore water pressure. Remedial measures include (a) Retaining structures with proper drainage outlet has to be provided and (b) Crown cracks are to be treated to avoid percolation of water through it.
41	Date of Reporting	: 04/07/2018
42	Landslide Category	: Category II

Slide-36:

No	Field		Description
1	Slide No.	:	KER/KNR/48P16/2018/01
2	State	:	Kerala

3	District	:	Kannur
4	Toposheet No.	:	48 P/16
5	Name of the slide	:	Parakkamala Landslide
6	NH/SH/Locality	:	Mudikkayam – Vaniyapara road
7	Latitude	:	12.0709
8	Longitude	:	75.7581
9	Length	:	m
10	Width	100	6 m
11	Height	Ü	m
12	Area	1	m^2
13	Depth	Ų.	m
14	Volume	-	m^3
15	Runout distance		Upto the road level
16	Type of Material	:	Debris
17	Type of movement	JI.	Flow
18	Rate of movement	:	Very Rapid
19	Activity	:	Reactivated (Earlier in July 2007)
20	Distribution	:	Retrogressive
21	Style	:	Complex
22	Failure mechanism	:	Shallow rotational (≤ 5m) failure
23	History	:	12 th June 2018 (18:00 hrs)
24	Geomorphology	:	Lowly dissected slope. The debris material flown towards N 275°.
25	Geology/Lithology	:	Gneiss
26	Structure		Shear zone having thickness of about 1m dipping 47° towards N 330°.
27	Landuse/ Landcover	1	Mixed cultivation
28	Hydrological condition	and the same	Wet
29	Triggering Factor	K:	Heavy Rainfall
30	Death of persons	1	Nil
31	People affected	1	Nil
32	Livestock Loss	. 6	Nil
33	Communication	:	Mudikkayam – Vaniyapara road
34	Infrastructure	17	Nil
35	Agriculture/forest/Barren	€.	Agricultural land damaged
36	Geo-scientific Causes		Excessive rainfall is the triggering factor which resulted in the reduction of strength on saturation and increase in pore water pressure.
37	Remedial measures		Unscientific hill slope modification has to be avoided. Avoid constructing houses/buildings along the debris flown nala path.
38	Remarks, if any	:	Debris material flown along the already existing nala resulted blockage of the road and damaged the small box culvert at the road bench.

39	Photos. Sketch of Plan & section of the slide	
40	Summary/Abstract	: A debris flow was occurred on 12 th June 2018 at Parakkamala where the debris material flown along an already existing nala path. This landslide is a reactivated one. Excessive rainfall is the triggering factor which resulted in the reduction of strength on saturation and increase in pore water pressure is the important cause. Remedial measures include (a) Unscientific hill slope modification has to avoided and (b) Avoid constructing houses/buildings along the debris flown nala path.
41	Date of Reporting	: 05/07/2018
42	Landslide Category	: Category II

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