巻末資料 2

斜面カルテによる調査結果

Code no.	Ν	1	5	_	1				
Region Office	Abbottabad								
Maintenance Unit					Bala	ako	t		

_	i a a ci o i i e	444			<u>, -</u>	<u> </u>			,	и.	<u> </u>	• •	_
	Coordinates	Latitude				N 34°27' 49.7"							
	Coordinates	Lo	ong	jitu	de		E 7	73°	19'	58	3.3"		
	Road name	N	1	5		Km	2	8	+	4	0	0	

Date	14-Dec-17
Inspector	Makoto Tokuda

[Causes]

ı	tem	factor	cat	tegory of score	Check		
ý١	q	tatus stope,		r more correspondences			
raph	pse tor	clear convex break of slope,	2 c	orrespondences	✓		
opography	Collapsed factor	eroded toe of slope,	1 c				
ţ	Ö	overhang, water catchment slope	no				
			ma				
	Soil	susceptible to erosion	a li				
s	0)	less strength with water	No	ne	✓		
tion		high density of cracks and a weak layers,	ma	arked			
ndi	Rock	susceptible to erosion,	a li	ttle marked	/		
Geological conditions	ď	fast weathering	No	ne			
gica			!	orresponds.			
olo	e	dip slope of bedding plane	No				
Ge	ctui	dobrio on importantility hadrook	_	ırked	Ť		
	Structure	debris on impermeability bedrock, the upper part is a hard /the toe of slope is		ttle marked			
	0,	weak.	Nο		./		
				instability			
		Topsoil, detached rock and unsteady rock	a li	/			
ے		Topooli, detaoned took and anoteday took	sta	 			
Surface codition			no				
8		Spring water					
эсе		Spring water	no				
urf			_	-			
(O)		Surface condition	ba				
		Surface condition	inte				
			ma	inly structure, mainly tree			
				H≧50m			
			height	30≦H<50m			
<u>e</u>			þ	15≦H<30m			
Profile		Height (H), dip (i)		H<15m			
-				i≧70°			
			dib	45°≦i<70°			
				i<45°	✓		
>	Surfac	ce collapse, small fallen rock, gully, erosion,	2 o	r more correspondences clarity	<u> </u>		
mal	piping	hole, subsidence, heaving, bending of tree root,	cei	✓			
Anomaly		tree, crack, open crack, anomaly of	no				
4	counte	ermeasure	[^{*****}				

Cou	ınte	rme	asu	re

[Disaster type]	
Rock fall	
Slope failure	\
[Main check o	bject
Cut slope	\
Natural slope	
•	

[Countermeasure]	
Type of countermeasures	
Retaining wall	
Effectiveness of existing countermeasures	Check
Potential slope failure are prevented enough, or, it is defended enough when it is generated.	
Potential slope failure are considerably prevented, or it is considerably defended when it is generated.	
Potential slope failure are partly prevented, or it is partly defended when it is generated. However, it is not enough for the remaining factors.	1
There is no countermeasure, or there is not effective even if countermeasures are not performed.	

Level of disaster history	Check
There is a history about large fallen rocks and slope failures that were obstacles to the road traffic after construction of recent measures.	
There is a history about large fallen rocks and slope failures that gets to the road though there is no obstacle to traffic.	1
There is a history about small fallen rocks and slope failures that did not get to the road.	
No disaster records	

[Expected size of disaster](width, length, depth, etc.)

60m(w)*20m(h)*1m(d)=1,200m3

[Hazard]

[r luzuru]		
	A: the possibility of collapse/fall is high	
	B: the possibility of collapse/fall is moderate	
	C: the possibility of collapse/fall is low/none	V

[Description]

Trace of the slope failure at the side of the stream.
Retaining wall is constructed at the toe of the slope.
However, the slope is covered with vegetation and seems stable.

Code no.	N	1	5	_	1				
Region Office	Abbottabad								
Maintenance Unit				Е	Bala	ako	ot		

Evaluation sheet (debris flow)

	Coordinates	Latitude				1	N 3	4°	27	'' 4 <u>!</u>	9.7	"	
	Coordinates	Longitude				E 73° 19' 58.3"							
	Road Name	N	N 1			Km	2	8	+	4	0	0	

Date	14-Dec-17
Inspector	Makoto Tokuda

[Causes]

Caus	bes]		
item	factor	category	Check
Property of river	areas that river bed is 15° or more in watershed area	0.50km ² or more 0.15km ² - 0.50km ²	
perty o		less than 0.15km ² 40°or more	V
Prog	steepest slope of river bed	30° - 40° less than 30°	√
	area that slope gradient is 30° or more in watershed area	0.20km ² or more 0.08km ² - 0.20km ² less than 0.08km ²	√
Property of slope	area that meadow and shrub (less than 10m height) occupy in watershed area	0.20km ² or more 0.02km ² - 20km ² less than 0.02km ²	/
operty	artificial works that cause negative effects	certain none	√
P	new crack and/or slope failure in stream	certain none	√
	traces of large slope failure in stream	certain none	1

[Road structure]

[ITOdd 3t	. actaroj	
structure	category of score	Check
	10m or more 5m - 10m 3m - 5m less than 3m	V
	less than 1m or No bridge / box culvert	1
Beam	1m - 2m	
height	2m - 3m	
	3m - 5m	
	5m or more	

[Potencial disaster mode]	Check
Damage of bridge/culvert	
Outflow of embankment	
Debris flooding on the road	1

[History]

[1.1101017]	
category of score	Check
There is a history about debris flow that were obstacles to the road traffic after construction of recent measures.	
There is a history about debris flow though there is no obstacle to traffic.	\
There is no history of debris flow	

[Expected size of disaster] (width, length, depth, etc.)

 $100(I)*1(w)*1(d) = 100m^3$

[Countermeasure]

Type of countern	Check	
Causeway, pipe cul	vert	
	none · lo	N 🗸
Effect of existing	moderat	е
countermesure	high	
	enough	

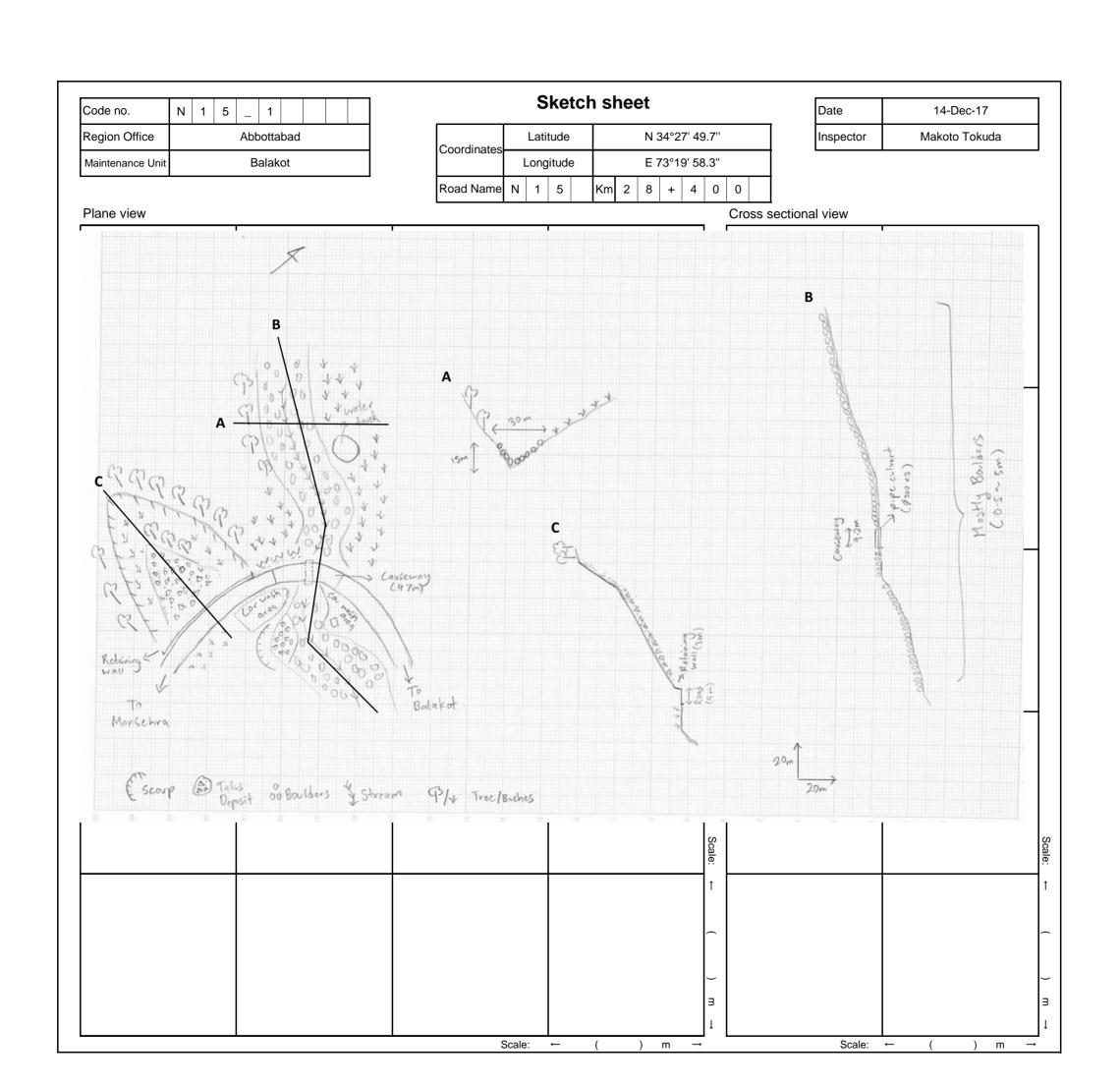
[Hazard]

	A: the possibility of debris flow is high	
Hazard rank:	B: the possibility of debris flow is moderate	>
	C: the possibility of debris flow is low/none	

[Description/comments]

Large boulders are deposited along the stream. However, the gradient of the river is low. The are 3 pipe culvert (\$\Phi\$ 30cm) below the causeway though the causeway are the main channel to let the water flow to the valley side during the heavy rain. Optical fibre cable is buried 1m at the mountain side of the road.

There are car wash area at the causeway.



Code no.	Ν	1	5	_	1				
Region Office	Abbottabad								
Maintenance Unit				В	alak	ot			

Coordinates		Lati	tude		N 34°27' 49.7"							
Coordinates	Longitude						Е	73°1	9' 58.	.3"		
Road Name	N	1	5		Km	2	8	+	4	0	0	

Date	14-Dec-17
Inspector	Makoto Tokuda



Mountain side: Large boulders are deposited on the mountain side.



Valley side: Large boulders are deposited on the valley side.



Road condition: The causeway is installed crossing the stream.



Existing countermeasures : Three pipe culvert are installed under the causeway.



Existing anomalies: Some trace of the slope failure was observed on the valley side of the road.



Others: Trace of the slope failure at the side of the stream.
Retaining wall is constructed at the toe of the slope.
However, the slope is covered with vegetation and seems stable.

Code no.	Ν	1	5	_	2				
Region Office	Abbottabad								
Maintenance Unit					Bala	ako	t		

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	Coordinates	Latitude			N 34° 33' 15.3"								
	Coordinates	Longitude			E 73° 21' 22.9"								
	Road name	Ν	1	5		Km	4	1	+	7	0	0	

Date	14-Dec-17
Inspector	Makoto Tokuda

[Causes]

	ltem	factor	cat	tegory of score	Check
topography	Collapsed factor	talus slope, clear convex break of slope, eroded toe of slope, overhang, water catchment slope	3 c 2 c 1 c no	<u> </u>	
SI	Soil	susceptible to erosion less strength with water	a li	irked ttle marked ne	√
Geological conditions	Rock	high density of cracks and a weak layers, susceptible to erosion, fast weathering	ma a li No	✓	
eologic	ure	dip slope of bedding plane	It c	orresponds. ne	√
9	Structure	debris on impermeability bedrock, the upper part is a hard /the toe of slope is weak.	ma a li No	√	
on		Topsoil, detached rock and unsteady rock	ins a li sta	✓	
Surface codition		Spring water	no se	√	
Sur		Surface condition	ba inte	√	
Profile		Height (H), dip (i)	height	inly structure, men tree H≧50m 30≦H<50m 15≦H<30m H<15m	√
			i≧70° 45°≦i<70° i<45°		√
Anomaly	piping fallen	be collapse, small len rock, gully, erosion, hole, subsidence, heaving, bending of tree root, tree, crack, open crack, anomaly of ermeasure	2 or more correspondences clarity certain unclarity none		

_						
Со	ıın	ıtΔ	rm	2	CI.	ırΔ

[Disaster type]]
Rock fall	
Slope failure	\
[Main check o	bject]
Cut slope	√
Natural slope	

[Countermeasure]	
Type of countermeasures	
None	
Effectiveness of existing countermeasures	Check
Potential slope failure are prevented enough, or, it is defended enough when it is generated.	
Potential slope failure are considerably prevented, or it is considerably defended when it is generated.	
Potential slope failure are partly prevented, or it is partly defended when it is generated. However, it is not enough for the remaining factors.	
There is no countermeasure, or there is not effective even if countermeasures are not performed.	1

[History]

Level of disaster history	Chec
There is a history about large fallen rocks and slope failures that were obstacles to the road traffic after construction of recent measures.	
There is a history about large fallen rocks and slope failures that gets to the road though there is no obstacle to traffic.	
There is a history about small fallen rocks and slope failures that did not get to the road.	1
No disaster records	

[Expected size of disaster](width, length, depth, etc.)

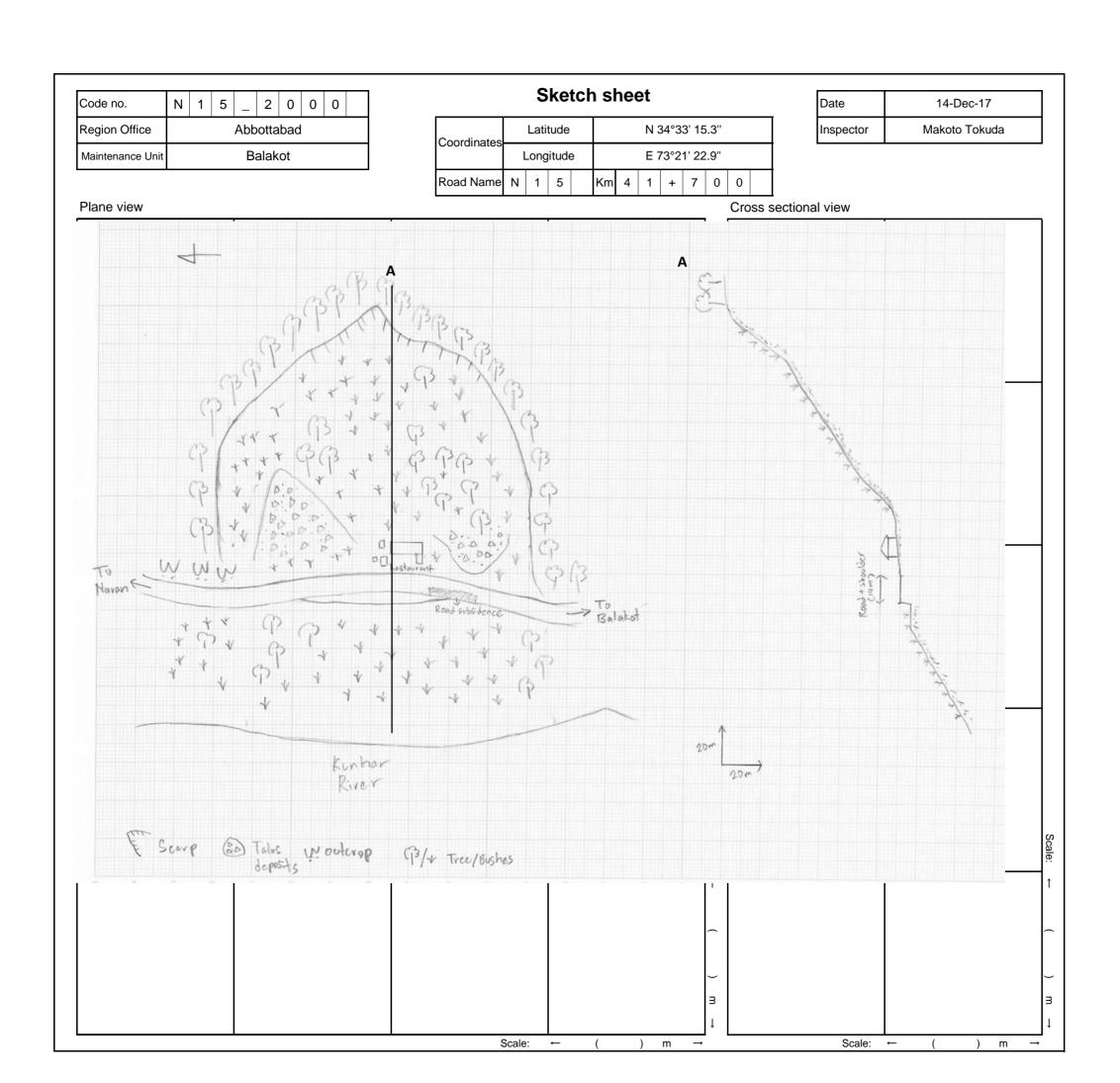
40m(w)*20m(h)*1m(d)=800m³

[Hazard]

[i lazara]		
	A: the possibility of collapse/fall is high	
Hazard rank	B: the possibility of collapse/fall is moderate	
	C: the possibility of collapse/fall is low/none	>

[Description]

Scarp can be observed on the top of the slope. Road subsidence (30m) was confirmed on the valley side of the road though the cause are unknown. However, no disaster were recorded in recent years. Weathered metamorphic rocks is distributed around the slope. A restaurant was constructed six months ago on the toe of the slope. Optical fibre cable is buried 1m at the mountain side of the road.



Code no.	N	1	5	_	2	0	0	0	
Region Office	Abbottabad								
Maintenance Unit	Balakot								

Coordinates		Lati	tude		N 34°33′ 15.3″							
Coordinates		Longitude			E 73°21' 22.9"							
Road Name	N	1	5		Km	4	1	+	7	0	0	

Date	14-Dec-17
Inspector	Makoto Tokuda





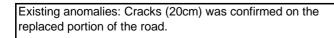


Mountain side: Scarp can be observed on the upper part of the slope. The slope is covered by tree and bushes.

Valley side: The valley is covered by tree and bushes.

Road condition: Partial of the road were replaced due to subsidence.







Existing countermeasures: The waterway is filled mostly by the talus.



Others: A restaurant was constructed six months ago at the toe of the slope.

Code no.	Ν	1	5	_	3					
Region Office	Abbottabad									
Maintenance Unit	Balakot									

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	Coordinates	Latitude			N 34° 39' 27"								
	Coordinates	Longitude			E 73° 30' 4.2"								
	Road name	N	1	5		Km	7	2	+	3	0	0	

Date	14-Dec-17
Inspector	Makoto Tokuda

[Causes]

I	tem	factor	cat	tegory of score	Che	
aphy	osed tor	talus slope, clear conve x bres k of slope,		or more correspondences	✓	
topography	Collapsed factor	clear conve x bres k of slope, eroded too of slope, overhang, water eatchment slope	1 correspondences no correspondence			
•	Soil	susceptible to erosion less strength with water	marked a little marked None			
Geological conditions	Rock	high density of cracks and a weak layers, susceptible to erosion, fast weathering	marked a little marked None			
eologice	ıre	dip slope of bedding plane	lt c	orresponds.	✓	
Ō	Structure	debris on impermeability bedrock, the upper part is a hard /the toe of slope is weak.	marked a little marked None			
on		Topsoil, detached rock and unsteady rock	instability a little unstable stability			
Surface codition		Spring water	notable spring waster seepage			
Surf		Surface condition	bare land with minor vagetation intermediate (bare grass tree) mainly structure, mainly tree			
Profile		Height (H), dip (i)	height	H≧50m 30≦H<50m 15≦H<30m H<15m	<u> </u>	
รั			i≧70° ਉ 45°≦i<70° i<45°		√	
Anomaly	piping fallen	hole, subsidence, heaving, bending of tree root, tree, crack, open crack, anomaly of ermeasure	2 or more correspondences clarity			

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(:nı	ıntei	rme	เลรเ	ıre

isaster type]	_	
Rock fall			Retaining wall
ope failure 🗸			Effectiveness of existing
ope failule	•		Potential slope failure are prevented enou
ain check object]		<u>-</u>	generated.
Cut slope	\		Potential slope failure are considerably prowhen it is generated.
atural slope			Potential slope failure are partly prevented generated. However, it is not enough for the
		•	There is no countermeasure, or there is no

Type of countermeasures	
Retaining wall	
Effectiveness of existing countermeasures	Check
Potential slope failure are prevented enough, or, it is defended enough when it is generated.	
Potential slope failure are considerably prevented, or it is considerably defended when it is generated.	
Potential slope failure are partly prevented, or it is partly defended when it is generated. However, it is not enough for the remaining factors.	
There is no countermeasure, or there is not effective even if countermeasures are not performed.	1

Level of disaster history	Check
There is a history about large fallen rocks and slope failures that were obstacles to the road traffic after construction of recent measures.	✓
There is a history about large fallen rocks and slope failures that gets	

to the road though there is no obstacle to traffic. There is a history about small fallen rocks and slope failures that did not get to the road.

No disaster records

[Expected size of disaster](width, length, depth, etc.)

400m(w)*300m(h)*1m(d)=120,000m³

[Hazard]

[History]

A: the possibility of collapse/fall is high	\
B: the possibility of collapse/fall is moderate	
C: the possibility of collapse/fall is low/none	

[Description]

The massive slope failure was triggered by the earthquake on 2013. Actual road is still buried 5m under the talus deposit. The removal of the talus deposit is still ongoing though it the work has to be done carefully as the small surface failure is continuouly occuring at the site. Outcrop (quartzite, shale) can be observed from the scarp of the slope. By pass road were constructed on the opposite of the river though the long-sized truck has a difficulity due to road allignment. Optical fibre cable is buried at the mountain side of the bypass road.

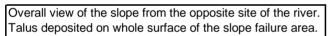
Code no. N	1 1 5 _ 3	Sketch s	heet	Date	14-Dec-17
Region Office	Abbottabad	Latitude	N 34°39' 27"	Inspector	Makoto Tokuda
Maintenance Unit	Balakot	Coordinates Longitude	E 73°30' 4.2"	1	
Plane view	A 33	Road Name N 1 5 Kn		sectional view	arp.
P P P P P P P P P P P P P P P P P P P	13 PP P P P P P P P P P P P P P P P P P	0.000000000000000000000000000000000000	A SA	Str Str Wort	us deposits went access road
P P P	Did a	0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	. To Balakot	Town access to be	Swied Load (Sm depth)
72	20 20 30 30 30 30 30 30 30 30 30 30 30 30 30		30 T () m	~ 1	

Code no.	N	1	5		3			
Region Office	Abbottabad							
Maintenance Unit				В	alak	ot		

Coordinates		Lati	tude		N 34°39' 27"							
Coordinates		ong	itude	Э	E 73°30' 4.2"							
Road Name	N	1	5		Km	7	2	+	3	0	0	

Date	14-Dec-17
Inspector	Makoto Tokuda







Valley side: Talus deposits can be observed on the valley side of the slope.



Road condition: Existing road is still buried 5m under the talus deposits.



Existing countermeasures: Temporary access road used for the long-sized truck which cannot pass the road alignment on the bypass road.



Existing countermeasures: Bailey bridge is used as temporary on the bypass road.



Mountain side: Talus deposits can be observed throughout the slope.

Code no.	Ν	1	5	_	4					
Region Office	Abbottabad									
Maintenance Unit	Balakot									

Coordinates	Latitude			N 34° 41' 1.6"							
Coordinates	Longitude			E 73° 34' 12.2"							
Road name	N 1 5			Km	8	1	+	4	0	0	

Date	13-Dec-17
Inspector	Makoto Tokuda

[Causes]

ı	tem	factor	cat	tegory of score	Check	
topography	Collapsed factor	talus slope, clear convex oreal of slope, eroded toe of slope, overhang, water catchment slope	2 c	or more correspondences correspondences correspondences correspondence	✓	
SI	Soil	susceptible to erosion less strength with water	a li	irked ttle marked ne	✓	
Geological conditions	Rock	high density of cracks and a weak layers, susceptible to erosion, fast weathering		irked ttle marked ne	✓	
eologic	ıre	dip slope of bedding plane	It c	orresponds. ne	√	
Ð	Structure	debris on impermeability bedrock, the upper part is a hard /the toe of slope is weak.	marked a little marked None			
on	Topsoil, detached rock and unsteady rock		ins a li sta	✓		
Surface codition		Spring water	no sec	√		
Sur	Surface condition		ba inte ma	✓		
Profile		Height (H), dip (i)	height	H≧50m 30≦H<50m 15≦H<30m H<15m	<u> </u>	
			i≧70° 45°≦i<70° i<45°			
Anomaly	piping fallen	e collapse, small fallen rock, gully, erosion, hole, subsidence, heaving, bending of tree root, tree, crack, open crack, anomaly of ermeasure		r more correspondences · clarity rtain · unclarity ne	✓	

[Countermeasure]

Rock fall Slope failure [Main check object] Cut slope Natural slope	[Disaster type]]
[Main check object] Cut slope	Rock fall	\
Cut slope 🗸	Slope failure	1
	[Main check o	bject
Natural slope	Cut slope	>
	Natural slope	

Type of countermeasures	
Retainiing wall, water canal	
Effectiveness of existing countermeasures	Check
Potential slope failure are prevented enough, or, it is defended enough when it is generated.	
Potential slope failure are considerably prevented, or it is considerably defended when it is generated.	
Potential slope failure are partly prevented, or it is partly defended when it is generated. However, it is not enough for the remaining factors.	1
There is no countermeasure, or there is not effective even if countermeasures are not performed.	

|--|

Level of disaster history	Check
There is a history about large fallen rocks and slope failures that were obstacles to the road traffic after construction of recent measures.	
There is a history about large fallen rocks and slope failures that gets to the road though there is no obstacle to traffic.	
There is a history about small fallen rocks and slope failures that did not get to the road.	✓
No disaster records	

[Expected size of disaster](width, length, depth, etc.)

100m(w)*50m(h)*0.5m(d)=2,500m³
Maximum rock fall size=3m*1m*1m=3m³

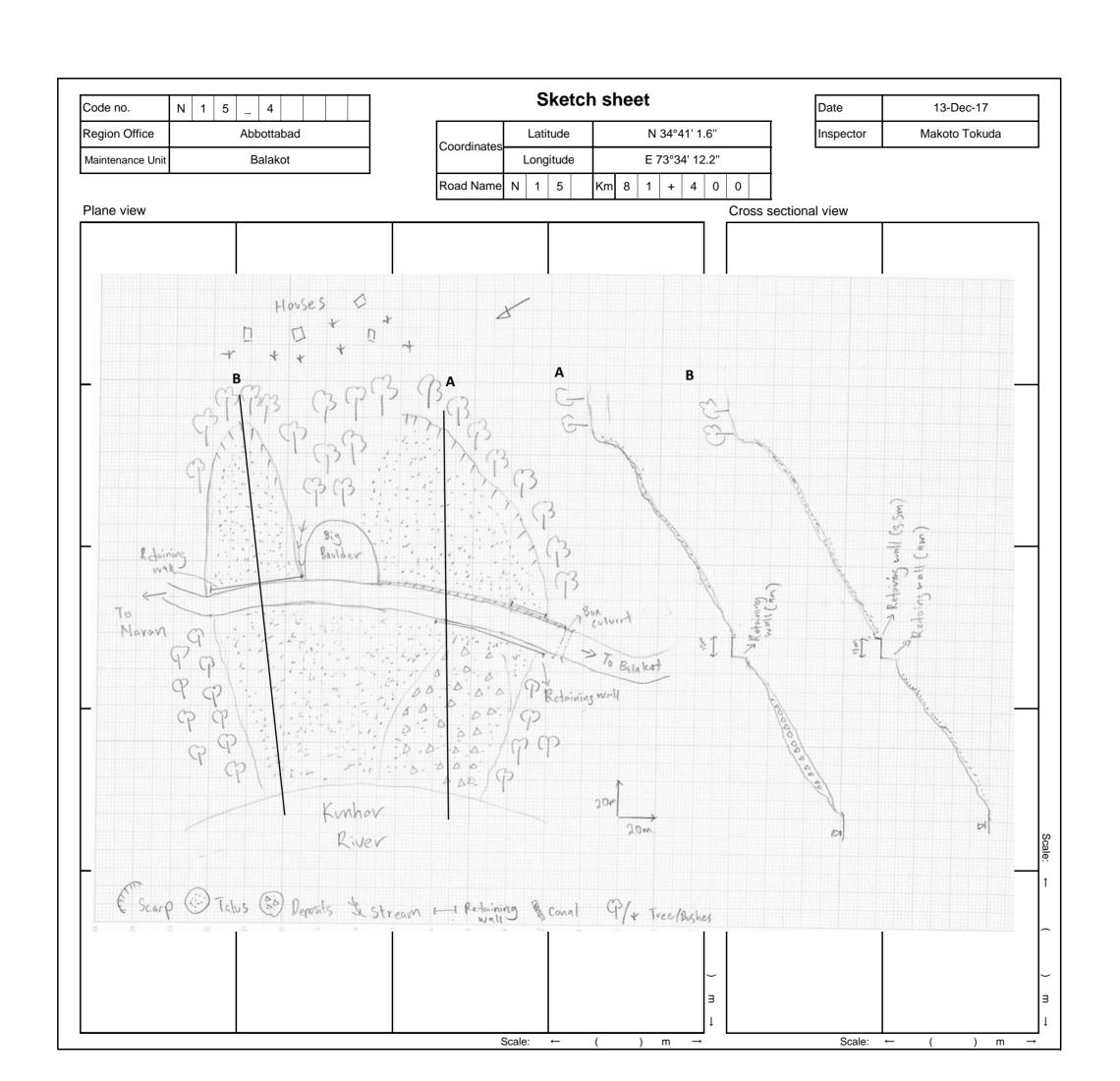
[Hazard]

A: the possibility of collapse/fall is high	
B: the possibility of collapse/fall is moderate	>
C: the possibility of collapse/fall is low/none	

[Description]

There is disaster recorded in the past and continuous surface failure is expected due to surface erosion.

Metamorphosed slate was observed at the site. Optical fibre cable is buried 1m at the mountain side of the road.



Code no.	Ν	1	5	-	4				
Region Office	Abbottabad								
Maintenance Unit	Balakot								

Coordinates	Latitude				N 34°41' 1.6"							
Coordinates	Longitude			E 73°34' 12.2"								
Road Name	N	1	5		Km	8	1	+	4	0	0	

Date	13-Dec-17
Inspector	Makoto Tokuda



Mountain side: The mountain side is covered mostly by the talus



Valley side: The valley side is covered mostly by the talus and several rocks



Road condition: road ditch is covered by debris



Existing countermeasures: Retaining walls are constructed partially on the mountain side. They are partially damaged by the slide



Part of the slope is highly eroded and shows multiple gullies



The outcrop that can be seen in the top part of the slope seems highly weathered

Code no.	N	1	5	_	5				
Region Office	Abbottabad								
Maintenance Unit				Е	Bala	ako	ot		

Evaluation sheet (debris flow)

Coordinates	Latitude			N 34° 43' 34.1"								
Coordinates	Longitude			E 73° 33' 36.4"								
Road Name	N	1	5		Km	8	6	+	4	0	0	

Date	13-Dec-17
Inspector	Makoto Tokuda

[Causes]

[Caus	500]		
item	factor	category	Check
Property of river	areas that river bed is 15° or more in watershed	0.50km ² or more 0.15km ² - 0.50km ²	✓
÷_ :⊑	area		
\ \ \	alea	less than 0.15km ²	
ert		40°or more	✓
g 6	steepest slope of river bed	30° - 40°	
Δ.		less than 30°	
	area that alone areadient is 200	0.20km ² or more	
	area that slope gradient is 30° or more in watershed area	0.08km^2 - 0.20km^2	✓
	of more in watershed area	less than 0.08km ²	
96	area that meadow and shrub	0.20km ² or more	✓
slog	(less than 10m height)	0.02km ² - 20km ²	
Property of slope	occupy in watershed area	less than 0.02km ²	
erty	artificial works that cause	certain	
ō	negative effects	none	✓
<u>-</u>	new crack and/or slope	certain	
	failure in stream	none	✓
	traces of large slope	certain	
	failure in stream	none	1

[Road structure]

[Noad Structure]					
structure	category of score	Check			
River width	10m or more 5m - 10m 3m - 5m less than 3m				
Doam	less than 1m or No bridge / box culvert 1m - 2m 2m - 3m 3m - 5m 5m or more	V			

[Potencial disaster mode]	Check
Damage of bridge/culvert	
Outflow of embankment	
Debris flooding on the road	1

[History]

category of score	Check
There is a history about debris flow that were obstacles to the road traffic after construction of recent measures.	√
There is a history about debris flow though there is no obstacle to traffic.	
There is no history of debris flow	

[Expected size of disaster] (width, length, depth, etc.)

200m(l)*3m(w)*2(d)=1,200m³

[Countermeasure]

Type of countern	Check	
Retaini	ng Wall	
	none · lo	W
Effect of existing	moderat	e 🗸
countermesure	high	
	enough	

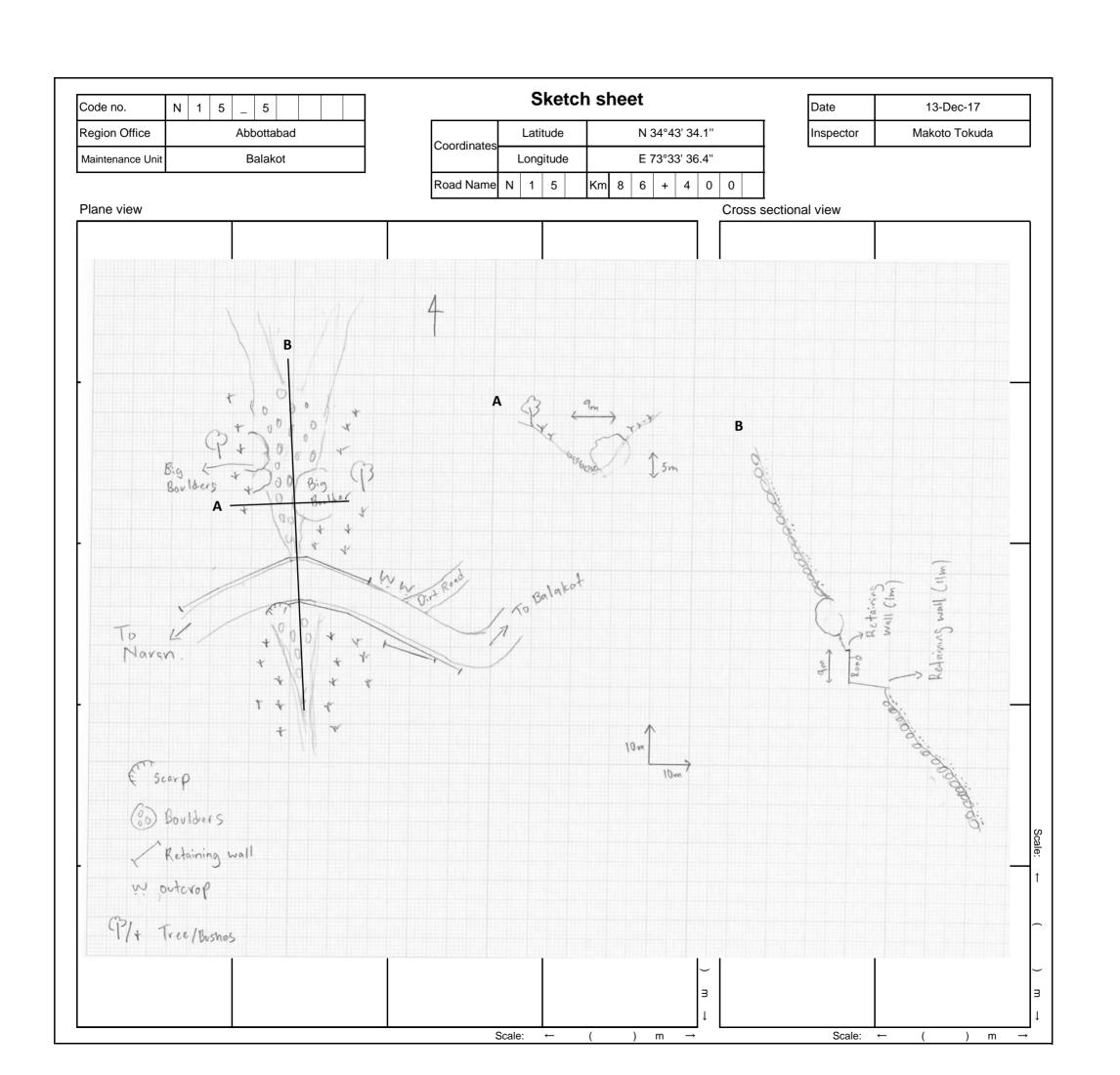
[Hazard]

	A: the possibility of debris flow is high	1
Hazard rank:	B: the possibility of debris flow is moderate	
	C: the possibility of debris flow is low/none	

[Description/comments]

Continuous debris flow is reported in this site.
According to the disaster record, the debris could cover 100m along the road.

Also, extra precaution shall be given for the big boulders located near the exit of the stream on the mountain side. Optical fibre cable is buried 1m at the mountain side of the road.



Code no.	N	1	5	_	5			
Region Office		Abbottaba				bad		
Maintenance Unit				В	alak	ot		

Coordinates	Latitude				N 34°43' 34.1"							
Coordinates		ong	itude	Э			E 7	73°3	3' 36	5.4"		
Road Name	N	1	5		Km	8	6	+	4	0	0	

Date	13-Dec-17
Inspector	Makoto Tokuda



Mountain side: Big boulders (2~5m) can be observed at the exit of the stream on the mountain side.



Valley side: The starting point of the stream on the valley side are narrow. Boulders can be observed on the valley side.



Road condition: there is mud and debris on the road and the road surface is damaged considerably



Existing countermeasures / anomalies: small damage (2m) of the retaining wall on the shoulder of the road (valley side) due to the debris flow.



Existing countermeasures / anomalies: The exit of the retaining wall on the mountain side was re-shaped to allow the debris flow. However, this is resulting a steeper angle of the stream. The thickness of the sediment in the stream



Possible countermeasures: a bridge can be constructed in the valley side of the road avoiding the debris flow stream.

Code no.	Ν	1	5	_	6				
Region Office	Abbottabad								
Maintenance Unit					Bala	ako	t		

_					<u>, </u>	. . .					<u> </u>		_
	Coordinates	Latitude			N 34° 45' 30.6"								
	Coordinates		Longitude			E 73° 31' 37.3"							
	Road name	Ζ	1	5		Km	9	6	+	5	0	0	

Date	12-Dec-17
Inspector	Makoto Tokuda

[Causes]

_	auses Item	factor	ca	tegory of score	Check			
_	Ī	to la	₩	or more correspondences				
opography	Collapsed factor	tak <u>ts slope,</u> clear convex break of slope.		correspondences	 			
ogr	ollap	clear convex break of slope, eroded toe of slope,	1 c	1				
top	ŏ	overhang, water catchment slope		correspondence				
			marked					
	Soil	susceptible to erosion	a little marked					
S	0)	less strength with water	No	ne				
conditions		high density of cracks and a weak layers,	ma	arked				
ndi	Rock	susceptible to erosion,	a li	ttle marked	√			
8	ď	fast weathering	No	ne				
Geological			It c	corresponds.	1			
olo	ē	dip slope of bedding plane		ne	 			
g	ctu	debris on impermeability bedrock,	ma	arked	Ė			
	Structure	the upper part is a hard /the toe of slope is	a li	ttle marked	1			
		weak.	None					
			ins	stability	1			
		Topsoil, detached rock and unsteady rock		ittle unstable				
ڃ	ropoon, actached rook and anotoday rook		sta	stability				
Surface codition			no	1				
00 €		Spring water	se					
face		, 5	none					
Sur			bare land with minor vagetation					
		Surface condition	intermediate (bare · grass · tree)					
			mainly structure, mainly tree					
				H≧50m	1			
			Ħ	30≦H<50m				
l			height	15≦H<30m				
Profile		Height (H), dip (i)	_	H<15m				
ď				i≧70°				
			dib	45°≦i<70°	1			
				i<45°				
			2 o	r more correspondences clarity	1			
laly		e collapse, smalktallen ock, gully, erosion, hole, subsidence, heaving, bending of tree root,		rtain • unclarity				
Anomaly		tree, crack, open crack, anomaly	no		·			
Ā	count	ermeasure	l					
Щ	<u> </u>		!					

Countermeasure	;
----------------	---

[Disaster type]]
Rock fall	>
Slope failure	1
[Main check o	bject
Cut slope	\
Natural slope	

Type of countermeasures	
Retaining walls, Gabions	
Effectiveness of existing countermeasures	Check
Potential slope failure are prevented enough, or, it is defended enough when it is generated.	
Potential slope failure are considerably prevented, or it is considerably defended when it is generated.	
Potential slope failure are partly prevented, or it is partly defended when it is generated. However, it is not enough for the remaining factors.	1
There is no countermeasure, or there is not effective even if countermeasures are not performed.	

г⊢	119	sto	٦r١

Level of disaster history	Check
There is a history about large fallen rocks and slope failures that were obstacles to the road traffic after construction of recent measures.	✓
There is a history about large fallen rocks and slope failures that gets to the road though there is no obstacle to traffic.	
There is a history about small fallen rocks and slope failures that did not get to the road.	
No disaster records	

[Expected size of disaster](width, length, depth, etc.)

50m(w)*100m(h)*2m(d)=10,000m3 Max Rockfall size=2m*1m*1m=2m3

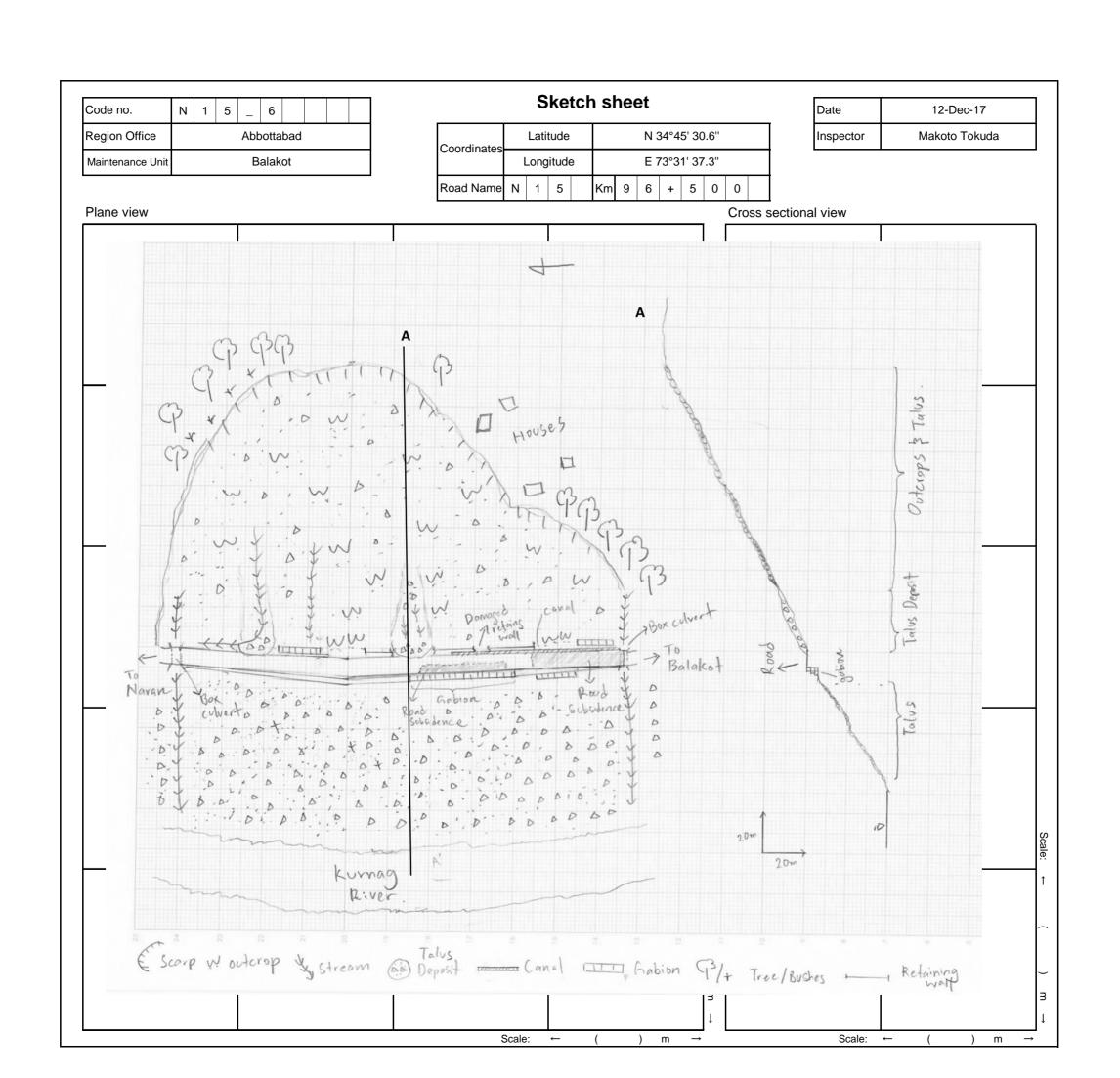
[Hazard]

	A: the possibility of collapse/fall is high	√
	B: the possibility of collapse/fall is moderate	
	C: the possibility of collapse/fall is low/none	

[Description]

The surface failures is causing the damages on the retaining wall. There are several unstable big boulders hanging on the mountain side which needs to be removed. The surface of the slope collapse after every removal of the debris (deposit). Spring water can be seen in multiple spots.

Cracks, road subsidence and cavity under the road has been confirmed at starting point (from Balakot) of the slope. Optical fibre cable is buried 1m at the mountain side of the road.

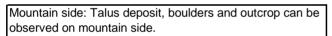


Code no.	N	1	5	_	6				
Region Office	Abbottabad								
Maintenance Unit				В	alak	ot			

Coordinates		Latitude				N 34°45' 30.6"						
Coordinates		ong	itude	Э			E 7	73°3	1' 37	'.3"		
Road Name	N	1	5		Km	9	6	+	5	0	0	

Date	12-Dec-17
Inspector	Makoto Tokuda







Valley side: Mostly talus deposit can be observed in the valley side.



Road condition: Two area of the road subsidence was confirmed. There might be a cavity underneath the road.



Existing countermeasures / anomalies: Several damages on the gabions was confirmed due to overload of the deposit.



Existing countermeasures / anomalies: The slope failure is causing rocks on the road.



Existing countermeasures / anomalies: Some part of the water canal are filled with the debris.

Code no.	N	1	5	_	7				
Region Office	Abbottabad								
Maintenance Unit				Е	Bala	ako	ot		

Evaluation sheet (debris flow)

Coordinates	Latitude				N 34° 46' 45.5"								
	Coordinates	Longitude				E 73° 31' 25.4"							
	Road Name	N	1	5		Km	9	9	+	9	0	0	

Date	12-Dec-17
Inspector	Makoto Tokuda

[Causes]

[Caus	500]		
item	factor	category	Check
of river	areas that river bed is 15° or more in watershed area	0.50km ² or more 0.15km ² - 0.50km ² less than 0.15km ²	✓
Property of river	steepest slope of river bed	40°or more 30° - 40° less than 30°	√
	area that slope gradient is 30° or more in watershed area	0.20km ² or more 0.08km ² - 0.20km ² less than 0.08km ²	√
Property of slope	area that meadow and shrub (less than 10m height) occupy in watershed area	0.20km ² or more 0.02km ² - 20km ² less than 0.02km ²	√
operty	artificial works that cause negative effects	certain none	√
Ā	new crack and/or slope failure in stream	certain none	/
	traces of large slope failure in stream	certain none	/

[Road structure]

[INDau Si	iruciurej	
structure	category of score	Check
River width	10m or more 5m - 10m 3m - 5m	
	less than 3m less than 1m or	
	No bridge / box culvert	
Beam	1m - 2m	✓
height	2m - 3m 3m - 5m	
	5m or more	

[Potencial disaster mode]	Check
Damage of bridge/culvert	\
Outflow of embankment	
Debris flooding on the road	

[History]

category of score	Check
There is a history about debris flow that were obstacles to the road traffic after construction of recent measures.	
There is a history about debris flow though there is no obstacle to traffic.	
There is no history of debris flow	1

[Expected size of disaster] (width, length, depth, etc.)

Not expected		

[Countermeasure]

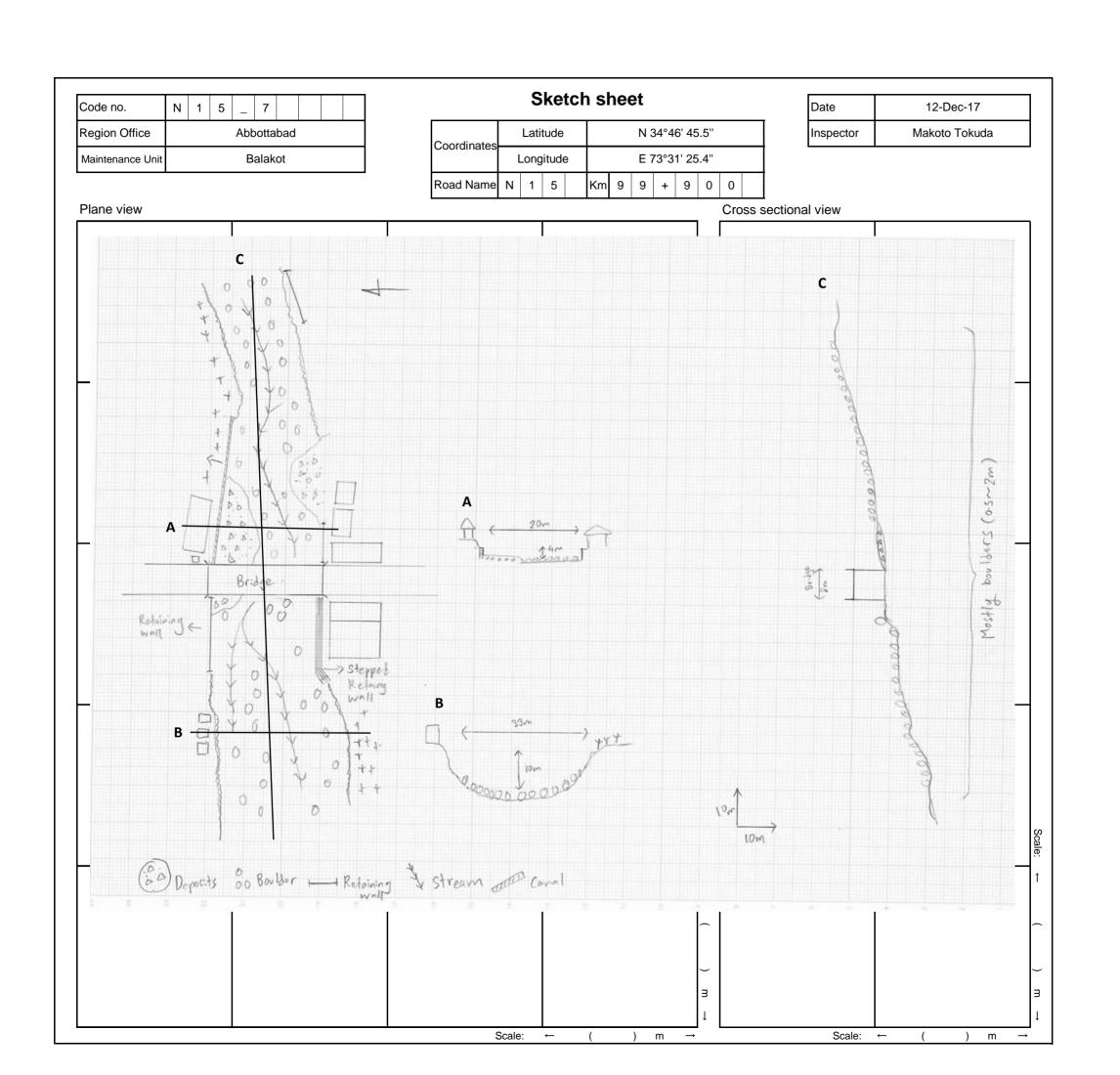
Type of countern	neasure	Check
Retaining wall		
	none · lo	N
Effect of existing	moderat	e 🗸
countermesure	high	
	enough	

[Hazard]

	A: the possibility of debris flow is high	
Hazard rank:	B: the possibility of debris flow is moderate	
	C: the possibility of debris flow is low/none	~

[Description/comments]

The stream is passing a populated area of the Kaghan city. There are boulders and surface waters at the bottom of the stream. The bailey bridge is constructed crossing the stream. The bridge seems have enough capacity for debris flows at present. Optical fibre cable is buried 1m at the mountain side of the road.



Code no.	N	1	5	-	7			
Region Office	Abbottabad							
Maintenance Unit				В	alak	ot		

Coordinates		Lati	tude		N 34°46' 45.5"							
Coordinates	Longitude		Э			E 7	73°3	1' 25	5.4"			
Road Name	N	1	5		Km	9	9	+	9	0	0	

Date	12-Dec-17
Inspector	Makoto Tokuda



Mountain side: Boulders and debris deposited along the gentle angle of the stream.



Valley side: Boulders and debris deposited along the gentle angle of the stream. The width of the river is wider on the valley side.



Road condition: No anomalies was confirmed on the road (bailey bridge)



Existing countermeasures: The height of the bridge from the stream bed seems have enough capacity for debris flows at present.



Existing countermeasures: Retaining wall is constructed on the both side of the bridge to protect the bank erosion.

Existing countermeasures / anomalies:

Photo

Code no.	Ν	1	5	_	8					
Region Office	Abbottabad									
Maintenance Unit	Balakot									

_		(
	Coordinates	La	titu	ıde		N 34° 51' 18.4"							
	Coordinates	Longitude				E 73° 35' 44.4"							
	Road Name	Ν	1	5		Km	1	0	8				

Date	9-Apr-18
Inspector	Wakita

[Causes]

_	ltem	factor	cat	egory of score	Check	
hy	þe	talus slope,	3 c	r more correspondences		
ırap	ollapse factor	clear convex break of slope,	2 c	orrespondences	✓	
topography	Collapsed factor	eroded toe of slope ,	1 c	orrespondences		
ᅌ)	overhang, water catchment slope		correspondence		
		avecantible to analism		rked		
	Soil	susceptible to erosion less strength with water	a li	ttle marked	✓	
SI		1033 Strongth with water	No			
Geological conditions	,	high density of cracks and a weak layers,	ma	irked	✓	
puc	Rock	susceptible to erosion,	a li	ttle marked		
<u>ا</u> د	œ	fast weathering	No	ne		
gica			It c	orresponds.		
olog	ē	dip slope of bedding plane	No	ne	√	
Ö	Structure	debris on impermeability bedrock,	ma	ırked		
	Str	the upper part is a hard /the toe of slope is	a li	ttle marked	1	
		weak.	No			
_			_	tability	1	
	Topsoil, detached rock and unsteady roc			ttle unstable	ļ	
u			stability			
condition				table spring waster		
con		Spring water				
ce		Opining water	none			
Surface				re land with minor vegetation	_	
ഗ		Surface condition			_	
		Surface condition		ermediate (bare grass tree)		
			ma	inly structure, mainly tree		
			t	H≧50m		
			ight	30≦H<50m		
<u>e</u>			hei	15≦H<30m		
Profile		Height (H), dip (i)		H<15m		
_			_	i≧70°	✓	
			dib	45°≦i<70°		
				i<45°		
>	Surfac	ce collapse, small fallen rock, gully, erosion,	2 о	r more correspondences clarity	✓	
nal	piping	hole, subsidence, heaving, bending of tree root,		tain•unclarity		
-	fallan	tree, crack, open crack, anomaly of	noi	ne	I	
Anomaly		ermeasure	1101		.l	

Countermeasure	,
----------------	---

		Type of countermeasures	
[Disaster type]]		
Rock fall	✓	Retaining walls (h=2m), Gabions	
Slope failure		Effectiveness of existing countermeasures	Checl
Slope failure		Potential slope failure are prevented enough, or, it is defended enough when it is	
[Main check o	bject]	generated.	
Cut slope		Potential slope failure are considerably prevented, or it is considerably defended when it is generated.	
Natural slope	✓	Potential slope failure are partly prevented, or it is partly defended when it is generated. However, it is not enough for the remaining factors.	~
	•	There is no countermeasure, or there is not effective even if countermeasures are not performed.	

[History]

Level of disaster history	Check
There is a history about large fallen rocks and slope failures that were obstacles to the road traffic after construction of recent measures.	~
There is a history about large fallen rocks and slope failures that gets to the road though there is no obstacle to traffic.	
There is a history about small fallen rocks and slope failures that did not get to the road.	
No disaster records	

[Expected size of disaster](width, length, depth, etc.)

Maximum rock fall size: 2m × 2m × 2m=8r

[Hazard]

A: the possibility of collapse/fall is high	\
B: the possibility of collapse/fall is moderate	
C: the possibility of collapse/fall is low/none	

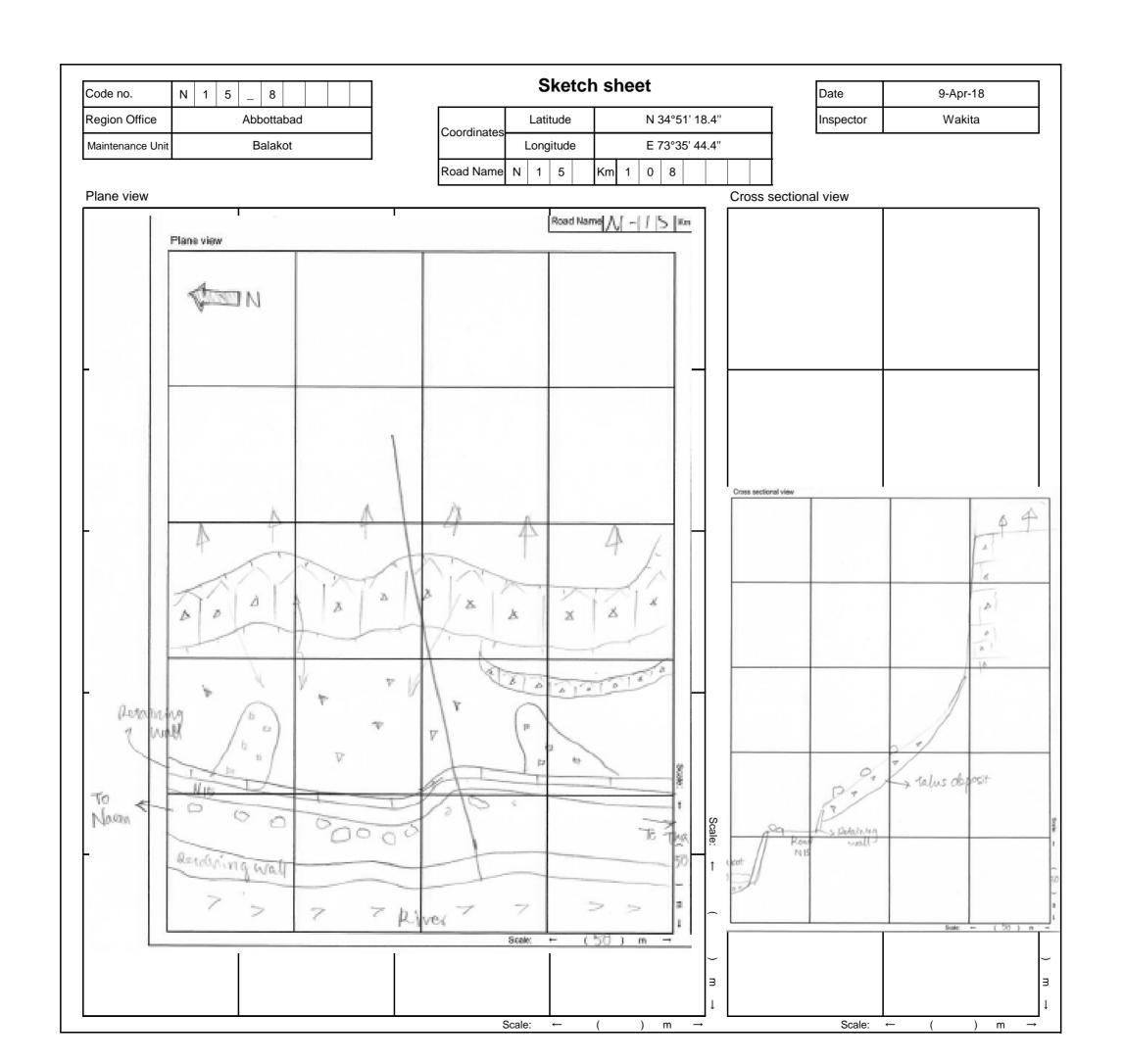
[Description]

A vertical rock wall of approximately 250 m produces rock falls towards the road. Terrain of the area is cupshaped valley, which means that the fallen rocks would be gathered into the valley and reach the road.

There are records that large fallen rocks happened and were obstacles to the road traffic.

The retaining wall has no effect as a countermeasure for rock falls.

The possibility of rock fall is very high.



Code no.	Ν	1	5	_	8			
Region Office				Abb	otta	bad		
Maintenance Unit				В	alak	ot		

Coordinates		Lati	tude		N 34°51' 18.4"							
Coordinates		ong	itude	Э	E 73°35' 44.4"							
Road Name	N	1	ongitude			1	0	8				

Date	9-Apr-18
Inspector	Wakita



A vertical rock wall of approximately 250 m produces rock falls towards the road. The retaining wall has no effect as a countermeasure for rock falls



Fallen rocks that have not reached the road but may collapse and fall again can be identified throughout the slope



The vertical rock wall that produces the falls seems to have significant fractures



There is eveidence of rock falls in the past that have been pushed to the valley side to clear the road



The biggest fallen rock identified (2m*1m*1m) has been pushed to the road side



The rock falls cause damage on the road bed forming pot holes

Code no.	Ν	1	5	_	9				
Region Office				Ab	bot	ttab	ad		
Maintenance Unit					Bala	ako	t		

_					<u>, </u>								_
	Coordinates Road name	L	ati	tud	е	N 34° 51' 47.98"							
	Coordinates	Longitude				E 73° 36' 11.83"							
	Road name	Ν	1	5		Km	1	1	0				

Date	9-Apr-18
Inspector	Wakita

[Causes]

-	auses tem	factor	cat	tegory of score	Chec				
hy	pe .	talus slope,							
opography	Collapsed factor	clear convex break of slope,	2 c	correspondences					
òd	Solla fa	eroded toe of slope, overhang, water catchment slope	1 c	correspondences					
t)	overnang, water catcriment slope	no	correspondence					
	_	susceptible to erosion	ma	arked					
	Soil	less strength with water		ttle marked					
SC		iooo on ongan man mate.	No	ne	\				
conditions	\	high density of cracks and a weak layers,	ma	arked	√				
puc	Rock	susceptible to erosion,	a li	ttle marked					
S S	Œ	fast weathering	No	ne					
Geological	ıre	dip slope of bedding plane	It c	corresponds.	✓				
Ö	Structure	debris on impermeability bedrock,	ma	arked					
	Strı	the upper part is a hard /the toe of slope is	a little marked						
		weak.	None						
			instability						
		Topsoil, detached rock and unsteady rock	a little unstable						
u		,	stability						
diti			no	table spring waster					
So		Spring water		epage	ſ				
эce		op.i.i.g italie.	none						
Surface condition				re land with minor vegetation					
(O)		Surface condition							
		Curiaco corramon	intermediate (bare · grass · tree) mainly structure, mainly tree						
			1116	H≧50m	_				
			¥	n≦50m 30≦H<50m	~				
			height						
ile		11 : 1 : (1) 1: (2)	ř	15≦H<30m					
Profile		Height (H), dip (i)		H<15m	— ,				
				i≧70°					
			ф	45°≦i<70°	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,				
				i<45°					
aly		ce collapse, small fallen rock, gully, erosion, hole, subsidence, heaving, bending of tree root,		r more correspondences · clarity	✓				
Anomal		tree, crack, open crack, anomaly of	no						
٩r		ermeasure							

_	
Counterme	OOLIFO

[Disaster type]	
Rock fall	\
Slope failure	\
[Main check o	bject]
Cut slope	
Natural slope	

[Countermeasure]		
Type of countermeasures		
Retaining wall		
Effectiveness of existing countermeasures	Check	
Potential slope failure are prevented enough, or, it is defended enough when it is generated.		
Potential slope failure are considerably prevented, or it is considerably defended when it is generated.		
Potential slope failure are partly prevented, or it is partly defended when it is generated. However, it is not enough for the remaining factors.		
There is no countermeasure, or there is not effective even if countermeasures are not performed.		

[History]

Level of disaster history	
There is a history about large fallen rocks and slope failures that were obstacles to the road traffic after construction of recent measures.	~
There is a history about large fallen rocks and slope failures that gets to the road though there is no obstacle to traffic.	
There is a history about small fallen rocks and slope failures that did not get to the road.	
No disaster records	

[Expected size of disaster](width, length, depth, etc.)

 $120m(L) \times 100m(W) \times 1m(D) = 12,000m^3$ including $2m \times 2m \times 2m$ rock

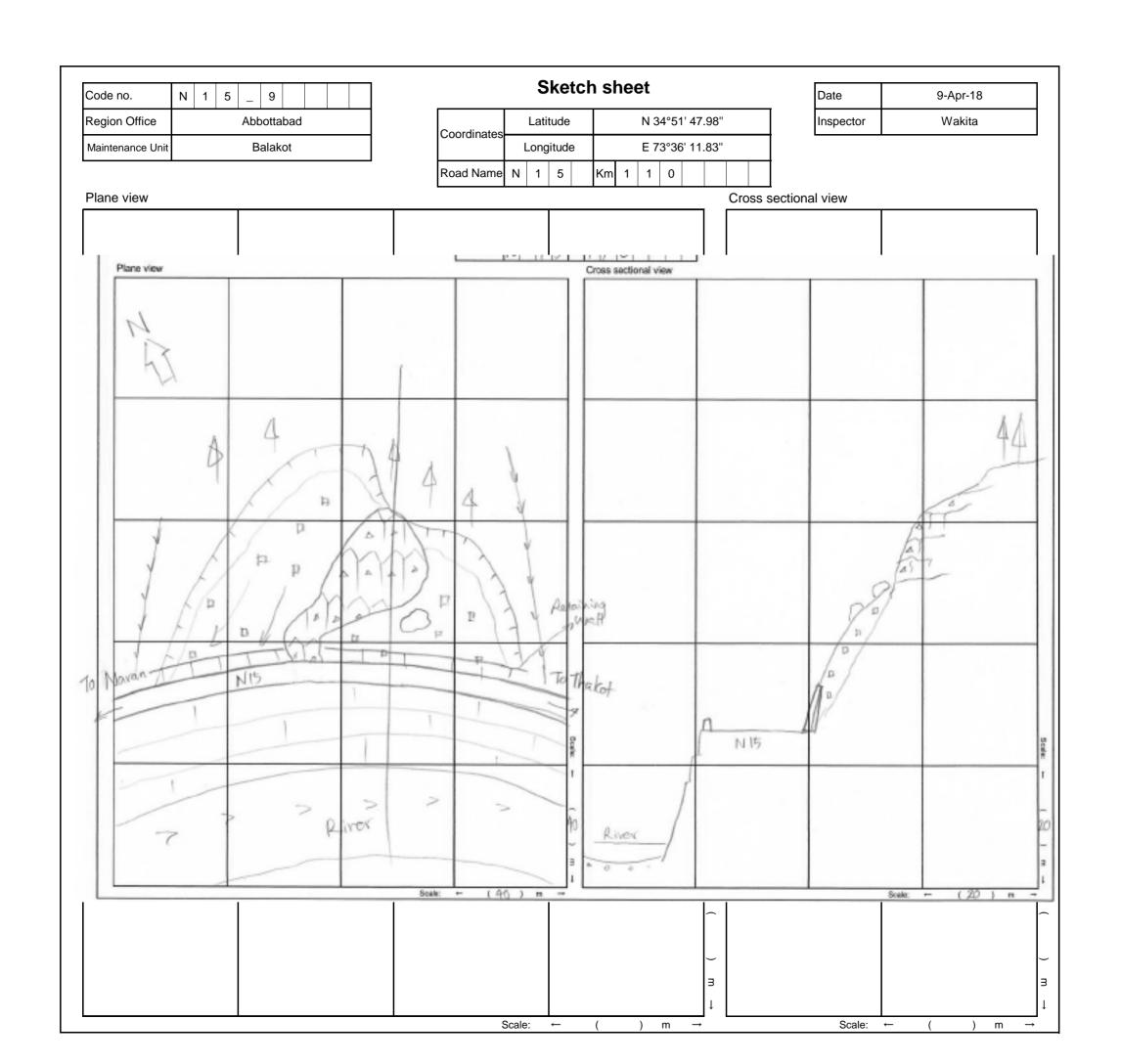
[Hazard]

	A: the possibility of collapse/fall is high	√
	B: the possibility of collapse/fall is moderate	
	C: the possibility of collapse/fall is low/none	

[Description]

Base rock is highly weathered and fractured rock, which is distirubuted in the area. It would be black muddy schists.

The base rock is susceptible to erosion and less strength with water. Accoding to NHA, slope failure happens and reached to the road every day, and is remarkable after rainfall especially. The retaining wall is NOT enogh to protect the road from the failure. The possibility of failure/fall is very high.



Code no.	N	1	5	_	9				
Region Office		Abbottabad							
Maintenance Unit				В	alak	ot			

Coordinates	Latitude				N 34°51' 47.98"							
Coordinates		ong	itude	Э	E 73°36' 11.83"							
Road Name	N	1	5		Km	1	1	0				

Date	9-Apr-18
Inspector	Wakita



Overall view of the slope. The debris produced from the highly weathered base rock is collapsing and affecting the road.



The valley side of the road is located in the outer curve of a river but it is protected by a concrete wall



The debris and rocks detached from the highly weathered base rock surpass the retaining wall and fall on top of the road



Condition of the road: the road needs to be cleared regularly due to constant collapse of the slope. The debris are removed to the valley side of the road.



Outcrops of the base rock can be identified throughout the slope. The outcrops are highly weathered and fractured.



In some sections the retaining wall is damaged and the debris reach the road directly.

Code no.	N	1	5	_	1	0				
Region Office	Abbottabad									
Maintenance Unit	Balakot									

Coordinates	Latitude			N 34° 52' 10.32"								
Coordinates	Lo	ngi	ituc	le	Е	73	3°	36'	41	.52	2''	
Road Name	Ν	1	5		Km	1	1	5				

Date	9-Apr-18
Inspector	Wakita

[Causes]

[Caus	pesj		
item	factor	category	Check
areas that river bed is 15° or more in watershed area		0.50km ² or more 0.15km ² - 0.50km ² less than 0.15km ²	√
Property of river	steepest slope of river bed	40°or more 30° - 40° less than 30°	✓
	area that slope gradient is 30° or more in watershed area	0.20km ² or more 0.08km ² - 0.20km ² less than 0.08km ²	√
Property of slope	area that meadow and shrub (less than 10m height) occupy in watershed area	0.20km ² or more 0.02km ² - 20km ² less than 0.02km ²	√
operty	artificial works that cause negative effects	certain none	V
Ā	new crack and/or slope failure in stream	certain none	√
	traces of large slope failure in stream	certain none	✓

[Road structure]

[Road St		
structure	category of score	Check
River width	10m or more 5m - 10m 3m - 5m less than 3m	
Doam	less than 1m or No bridge / box culvert 1m - 2m 2m - 3m 3m - 5m	'
	5m or more	

[Potential disaster mode]	Check
Damage of bridge/culvert	
Outflow of embankment	
Debris flooding on the road	✓

[History]

[1 110101]]	
category of score	Check
There is a history about debris flow that were obstacles to the road traffic after construction of recent measures.	√
There is a history about debris flow though there is no obstacle to traffic.	
There is no history of debris flow	

[Expected size of disaster] (width, length, depth, etc.)

 $200m(L) \times 4m(W) \times 2m(D) = 1,600m^3$ including $4m \times 4m \times 2m$ rock

[Countermeasure]

Type of countern	Check	
No coutne	ermeasure	
	none · lo	w /
Effect of existing	moderat	е
countermeasure	high	
	enough	

[Hazard]

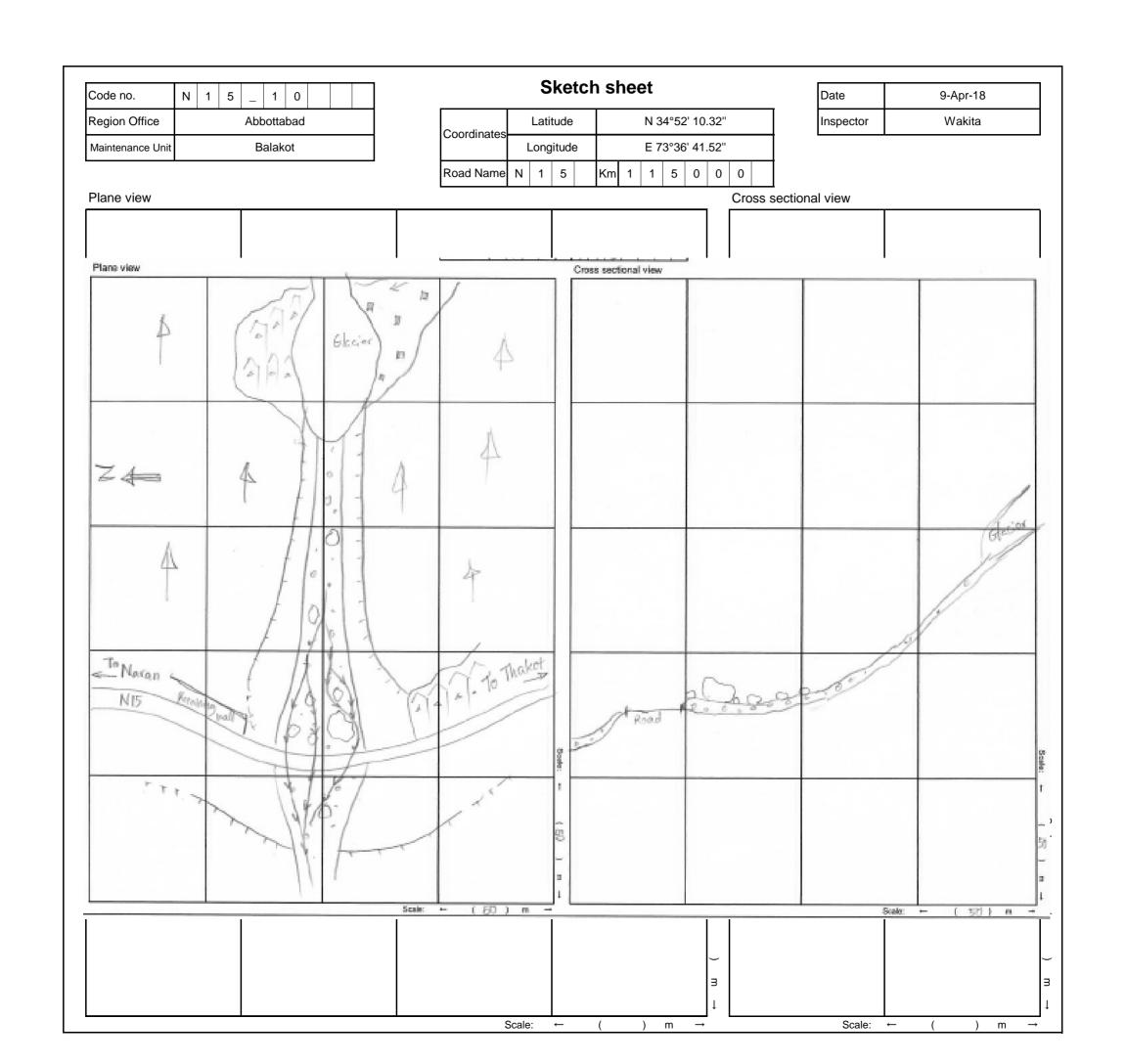
	A: the possibility of debris flow is high	1
Hazard rank:	B: the possibility of debris flow is moderate	
	C: the possibility of debris flow is low/none	

[Description/comments]

The river crosses on the road. In winter season, glacial mass from the upper side of the river moves downward and covers the road.

Debris, sand and rocks, which could be debris flow, are filled on the river. Surface water and debris are continuously flowed out to the road, especially in snow melting season. There is no countermeasures for the debris flow.

The possibility of debris flow is high.



Code no.	N	1	5	_	1	0		
Region Office	Abbottabad							
Maintenance Unit				В	alak	ot		

Coordinates	Latitude			N 34°52' 10.32"								
Coordinates	Longitude					E 7	73°36	6' 41.	52"			
Road Name	N	1	5		Km	1	1	5	0	0	0	

Date	9-Apr-18
Inspector	Wakita



Overall view of the debris flow affecting the road



Valley side: debris flow deposits head towards the river. The geomorphology on which it lays is an alluvial fan



The mountainside of the road is full of debris flow deposits and a glacier can be seen at the end of the valley



There is a big collapsed slope in the water catchment area



Big sized boulders (5m*8m*3m) can be seen on the stream bed. The Sides of the stream are completely bare and highly erodable



The road is flooded and partially covered by debris

Code no.	Sat	_	Ν	1	5	4	
Region Office							
Maintenance Unit							

Evaluation sheet (landslide)

Coordinates					34°	° 55	' 43	3.4"		
Coordinates	Longitude				73°	40	51	1.4"		
Road Name					Km					

Date	2018/6/19
Inspector	Basharat, Yasir, Sajid, Shafiq

[Main body of landslide]

1	
Mountain side	
Valley side	٧
Both	

[Causes]

		Category	Check
		exist clearly	٧
	Result of photo interpretation	exist but partial and not clear	
	interpretation	exist but not clear	
Topographical factor		large and new cracks, steps and subsidence	
lactor	Surface	small and old cracks, steps and subsidence	٧
	anomalies	slight deformation	
		no anomalies	
	0 1 1	fault, fracture zone	
	Geological structure	dip slope	
	Structure	undip slope/ no characteristic feature	٧
		metamorphic rock (schist, quartzite, phyllite etc.)	٧
Osslaniasl	Main rock formation of	sedimentary rock (sandstone, limestone etc.)	
Geological conditions	landslide body	igneous rock (granite etc.)	٧
Conditions	landende sedy	quaternary deposit (colluvial deposit etc.)	
		much springs / much seepage	٧
	Hydrological	little springs /little seepage	
	feature	trace of water	
		no water observed	

[History]

	category				
	Existing record (documents or	obvious slight	٧		
Records of	Damage on road	none			
Landslide		obvious	٧		
		slight			
	houses	none			

[Countermeasure]

Category	Check	Type of countermeasure	
There is no countermeasure			
Effectiveness of countermeasure	No effect	٧	Retaining Wall has been
	Some effect		constructed
Codificilitation	High effect		

[Evaluation Rank]

Scale of disaster	Big	Medium	Small
Great risk	1	2	3
Medium risk	1)	2	3
Low risk	2	3	4

Organization responsible for countermeasure works according to the scale of the disaster

Influence on the traffice when potential disaster

-Big: Grant aid

,

-Great risk: road closed for 2 days or more -Medium risk: road closed for 1 day or less

-Medium: Major contractor in Pakistan -Small: Local contractor

-Low risk: no road closure

[Expected size of disaster] (width, length, depth, etc.)

L=300m , W=500m , D=40m

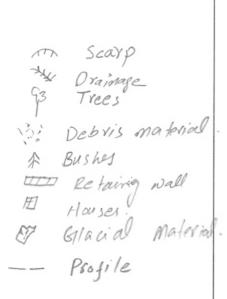
[Description]

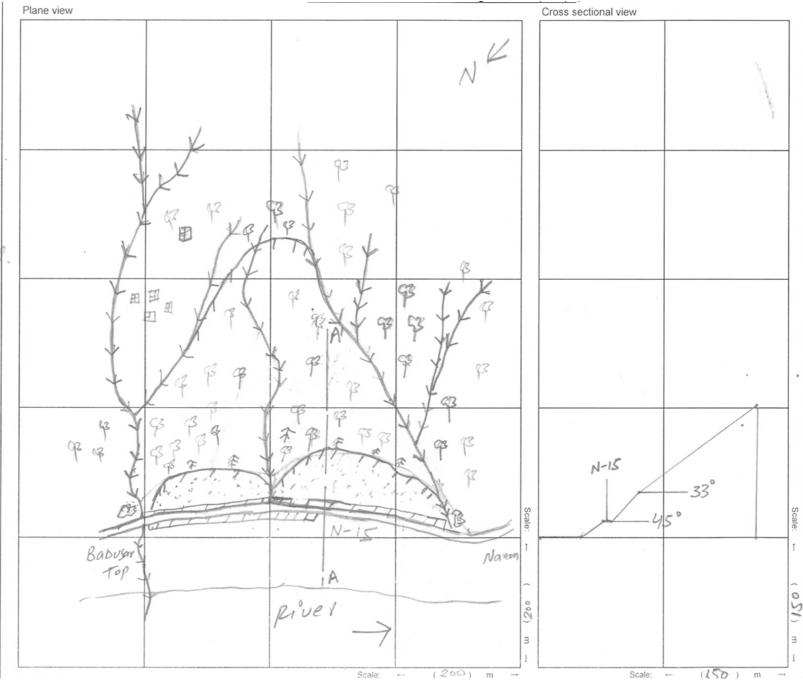
This landslide is located along N-15, about 3 km away from the Naran town. It is an old rotational landslide which has been reactivated due to road construction and rainfall. The upper part of the landslide is stable with vegetation cover, however, the landslide is active at the toe. Thick forest is also present on the left side of the slide. Due to re-activation of this slide about 100 meters road has been affected. Above the road the landslide scarp is clearly visible. Many detached boulders are hanging on the landslide scarp that can damage the road and the continuity of traffic. The boulders comprising of granite and schist ranges between 1-3 m3 size was present. A retaining wall above 2 m height has been constructed to protect the road from the slide material. However, the central part of this retaining wall has been damaged due to the reactivation of the slide material. Presently, there is no high risk to damage the road, however, in the future if the whole mass of the landslide body will move, lead to the damage and block the road for the continuity of traffic. For mitigation purpose, a retaining wall with a height of 5 meters has been suggested with proper drainage control.

Code no.	Sat_	Ν	1	5	_	4	
Region Office							
Maintenance Unit							

Coordinates	La	34° 55′ 43.4″								
Coordinates	Loi	73° 40' 51.4"								
Road Name			Km							

Date	2018/6/19
Inspector	Basharat, Yasır, Sajıd, Shafiq





Code no.	Sat_	N	1	5	_	4	
Region Office							
Maintenance Unit							

Coordinates	Latitude				34° 55' 43.4"							
Coordinates		Longitude				73° 40' 51.4"						
Road Name					Km							

Date	2018/6/19
Inspector	Basharat, Yasır, Sajıd, Shafiq







Full view of the landslide

View of landslide on Valley side:

Road condition







View of the Landslide at the middle point

Existing countermeasures / anomalies: View of damaged Retaining Wall as counter measure

View of Glacier on the left flank of the Landslide

Code no.	Sat	_	Ν	1	5	8	
Region Office							
Maintenance Unit							

Coordinates	Latitude				34º 56' 17.8"							
Coordinates	Longitude			73° 40' 51.4"								
Road Name					Km							

2018/6/20 Date Yasir, Basharat, Shafiq, Inspector Sajid

[Pagine]]

Caus	bes]		
item	factor	category	Check
er	areas that river bed is 15°	0.50km ² or more	٧
Ŀ	or more in watershed	0.15km² - 0.50km²	
/ of	area	less than 0.15km ²	
Property of river		40°or more	٧
rop	steepest slope of river bed	30° - 40°	
Д		less than 30°	
	and that alone and institute 200	0.20km ² or more	
	area that slope gradient is 30° or more in watershed area	0.08km² - 0.20km²	٧
	or more in materials and	less than 0.08km ²	
)e	area that meadow and shrub	0.20km ² or more	
slop	(less than 10m height)	0.02km² - 20km²	
Property of slope	occupy in watershed area	less than 0.02km ²	٧
ərty	artificial works that cause	certain	
do.	negative effects	none	٧
ď	new crack and/or slope	certain	٧
	failure in stream	none	
	traces of large slope	certain	٧
	failure in stream	none	

[Road structure]

structure	category of score	Check
	10m or more 5m - 10m 3m - 5m	
	less than 3m	٧
	less than 1m or	
	No bridge / box culvert	٧
Beam	1m - 2m	
height	2m - 3m	
	3m - 5m	
	5m or more	

[Potencial disaster mode]	Check
Damage of bridge/culvert	
Outflow of embankment	
Debris flooding on the road	٧

[History]

category of score	Check
There is a history about debris flow that were obstacles to the road traffic after construction of recent measures.	٧
There is a history about debris flow though there is no obstacle to traffic.	
There is no history of debris flow	

[Expected size of disaster] (width, length, depth, etc.)

L= 1000 m, W= 600 m, D= 6 m

[Countermeasure]

Type of countermeasure						
moderat high						
	n Wall ng walls none · lov moderat					

[Evaluation Rank]

[Evaluation reality										
Scale of disaster Risk	Big	Medium	Small							
Great risk	1	2	3							
Medium risk	1	2	3							
Low risk	2	3	4							

Organization responsible for countermeasure works according to the scale of the disaster

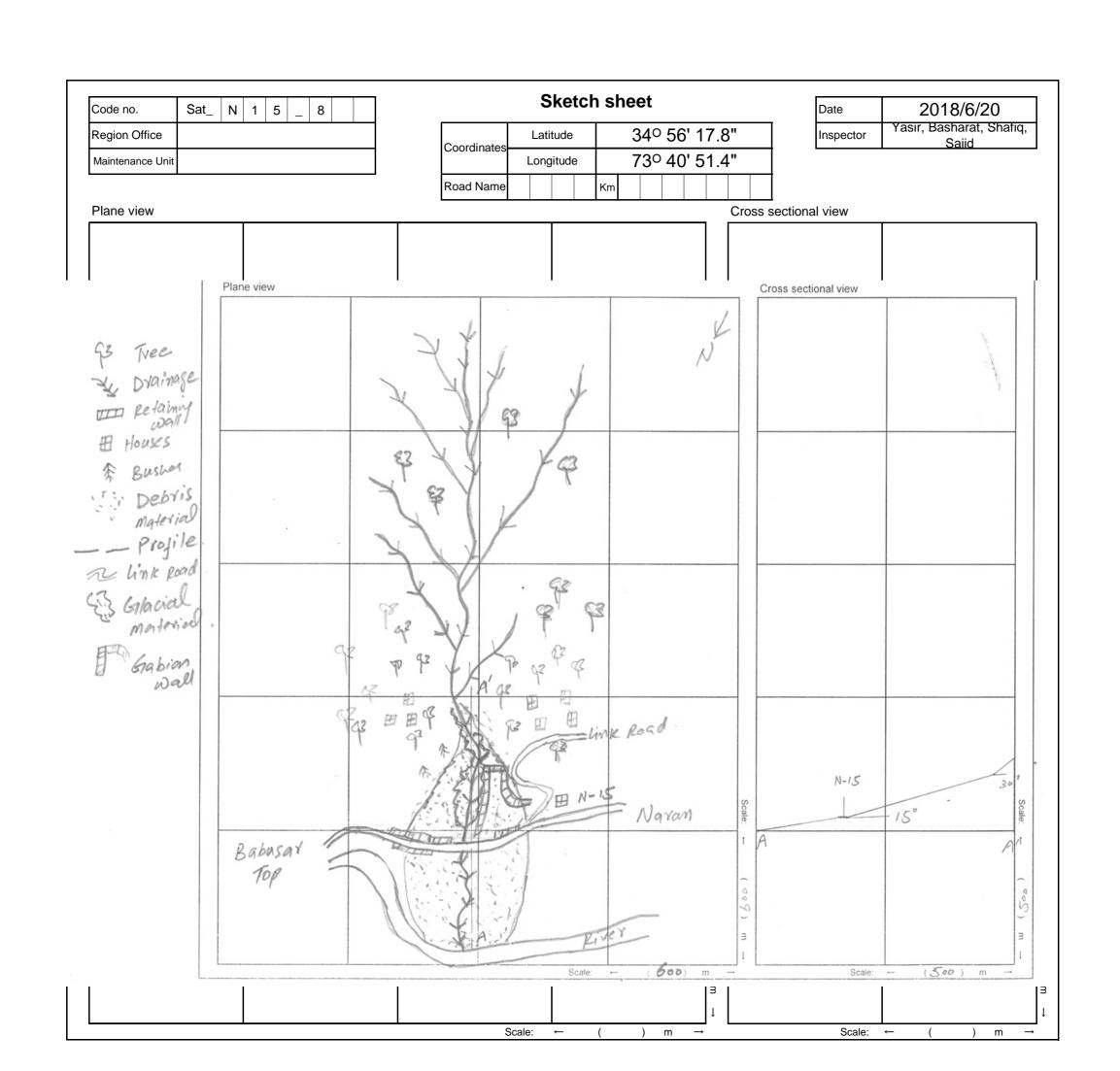
- -Big: Grant aid
- -Medium: Major contractor in Pakistan
- -Small: Local contractor

Influence on the traffice when potential disaster

- -Medium risk: road closed for 1 day or les
- -Low risk: no road closure

[Description/comments]

This is an active debris flow with large catchment area. The debris flow origin appears from the glacier valley. The debris material mainly comprises boulders, cobble, gravel, sand and silt. The size of the boulders ranges upto 5 m3. The debris flow has a large amount of water in the channel posing great and frequent risk to road. Very huge material is present on both the sides of the erosional channel. The gabion wall has seen at the mouth of the channel to control the debris, however, no culvert has been constructed for the outlet of the water and debris flow material. Therefore, this debris flow posing a significant threat for -Great risk: road closed for 2 days or more the continuity of traffic on the road, particularly during heavy rainfall. According to the local inhabitants a very serious debris flow disaster occurred after every five years at the site. For the mitigation measures it has been suggested to construct the culvert for the outlet of the water flow and develop the erosional channel properly.



Code no.	Sat_	N	1	5	_	8	
Region Office							
Maintenance Unit							

Coordinates	Latitude				34º 56' 17.8"							
Coordinates		Longitude			73° 40' 51.4"							
Road Name					Km							

Date	2018/6/20
Inspector	Yasir, Basharat, Shafiq, Sajid





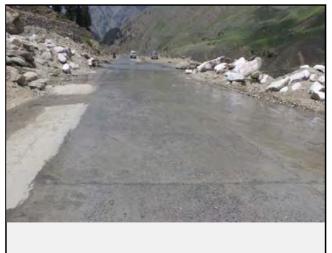


Mountain side view of the debris flow

Valley side view of the debris flow

Front view of the debris flow







The boulder has been found along the debris flow

Road condition

Existing countermeasures / anomalies:Gabion wall has been constructed along the Debris Flow

Code no.	Sat	_	Ν	1	5	9	
Region Office							
Maintenance Unit							

Coordinates	Latitude			34° 56' 22.4"									
Coon	ulilates	Longitude		73° 42' 45.6")"			
Road	l Name					Km							

2018/6/21 Date Yasir, Basharat, Shafiq, Inspector Sajid

[Causes]

Caus			<u> </u>
item	factor	category	Check
Property of river	areas that river bed is 15° or more in watershed	0.50km ² or more 0.15km ² - 0.50km ²	٧
o t	area	less than 0.15km ²	
erty		40°or more	٧
5	steepest slope of river bed	30° - 40°	
Δ.		less than 30°	
	area that slope gradient is 30°	0.20km ² or more	٧
	or more in watershed area	0.08km ² - 0.20km ²	
		less than 0.08km ²	
be	area that meadow and shrub	0.20km ² or more	
slo	(less than 10m height)	0.02km ² - 20km ²	
Property of slope	occupy in watershed area	less than 0.02km ²	٧
ert/	artificial works that cause	certain	
op	negative effects	none	٧
۵	new crack and/or slope	certain	٧
	failure in stream	none	
	traces of large slope	certain	٧
	failure in stream	none	

[Road structure]

structure	Check	
	10m or more	
River	5m - 10m	
width	3m - 5m	
	less than 3m	٧
	less than 1m or	
	No bridge / box culvert	٧
Beam	1m - 2m	
height	2m - 3m	
	3m - 5m	
	5m or more	

[Potencial disaster mode]	Check
Damage of bridge/culvert	٧
Outflow of embankment	٧
Debris flooding on the road	٧

[History]

[i ilotory]	
category of score	Check
There is a history about debris flow that were obstacles to the road traffic after construction of recent measures.	٧
There is a history about debris flow though there is no obstacle to traffic.	
There is no history of debris flow	

[Expected size of disaster] (width, length, depth, etc.)

L= 500 m, W= 200 m, D= 8-10 m

[Countermeasure]

Type of counterm	Check	
Channel Diversion Retainir	•	Culvert
Effect of existing	none · lo	
countermesure	high	
	enough	

[Evaluation Rank]

Scale of disaster Risk		Medium	Small
Great risk	1	2	3
Medium risk	1	2	3
Low risk	2	3	4

Organization responsible for countermeasure works according to the scale of the disaster

- -Big: Grant aid
- -Medium: Major contractor in Pakistan
- -Small: Local contractor

Influence on the traffice when potential disaster

- -Great risk: road closed for 2 days or more
- -Low risk: no road closure

[Description/comments]

The debris material might be active during the rainfall and can also lead to a debris flow disaster in future. Presently, the water is flowing through a narrow channel and along the road it is diverted through channel to reduce its impact on road damage. The loose debris comprises boulder, cobble, gravel, sand and silt. It is likely that future debris flow will continue along the slope. A retaining wall is constructed to protect the road which is also partly damaged. However, no countermeasures have been taken to drain the water and protect the road from the debris material. The debris flow -Medium risk: road closed for 1 day or les posing risk of road damage in future.

Code no. Sat_ N 1 5 _ 9		Sketch s	heet	Date	2018/6/21
Region Office		Latitude	34° 56' 22.4"		Yasir, Basharat, Shafid
Maintenance Unit	Coordinates	Longitude	73° 42' 45.6"		Saiid
	Road Name	Km			
Plane view			Cro	ss sectional view	
	1		1/		
Y Drainage	X }		N		
93 Tree	1 4	,	13		1
2 11/	1				
* Bushes	1	03)
# Houses	102 XX	4			
A culvet	10 17				
prin Relativy	4 43				
Debvis Material. Que Profile.	A X				
i. October	1 fx	9			
Profile.	(2 d2) × 92				
2	7 P V 92	1/.			
	4 4				
		1 44			
	43				
	93 / 93				
9	8 4 8				
q	3 (A) A				
	The & ds d3			N-15	
٣ / ٢	A 1100 00				
	Man PA		l _o		18°
	李 田	N-1	Scale:		
R. h. i	The state of the s	71	Naran I A		n
Babu Sar Top	N. Comments	Y Link Rose	7		
\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	1/3/3/1		G		
	E AT		00		
X	5 1		. 3		
	R	ver	٦		
	100	tale: - (5	0∂) m →	Scale:	(250) m →

Code no.	Sat_	N	1	5	_	9	
Region Office							
Maintenance Unit							

Coordinates	Latitude				34 ⁰	56	3' 22	2.4"	ı	
Coordinates	Longitude			73 ⁰	42	2' 45	5.6"	1		
Road Name				Km						

Date	2018/6/21
Inspector	Yasir, Basharat, Shafiq, Sajid







Mountain side view of the debris flow

Valley side view of the debris flow

Outlet of Culvert constructed







The boulder has been found along the debris flow

Road condition

Existing countermeasures / anomalies:Retaining wall has been constructed along the Debris Flow which has been damaged by the debris material

Code no.	Sat	_	Ν	1	5	_	2	4	
Region Office									
Maintenance Unit									

Evaluation sheet (Slope failure/Rockfall)

				<u>, </u>		_						
Coordinates	L	Latitude 34º 56							5' 19.9"			
Coordinates	Longitude			7	'3 ⁽	5	0'	59	9.7	711		
Road name					Km							

Date	2018/6/22
Inspector	Yasır, Basharat, Shafiq, Səjid

[Causes]

<u> </u>	auses Item	J factor	ca	tegory of score	Check	
topography	Collapsed factor	talus slope, clear convex break of slope, eroded toe of slope , overhang, water catchment slope		or more correspondences correspondences correspondences	٧	
	Soil (susceptible to erosion less strength with water	ma a I	correspondence arked ittle marked one	٧	
Geological conditions	Rock	high density of cracks and a weak layers, susceptible to erosion, fast weathering	a I	arked ittle marked one	٧	
Geologic	ture	dip slope of bedding plane	No	corresponds.	٧ ٧	
	Structure	debris on impermeability bedrock, the upper part is a hard /the toe of slope is weak	a I	marked a little marked None		
u		Topsoil, detached rock and unsteady rock	a I	instability a little unstable stability		
Surface codition		Spring water	no se	٧		
Surf		Surface condition	ba	bare land with minor vagetation intermediate (bare grass tree) mainly structure, mainly tree		
Profile		Height (H), dip (i)	height	H≧50m 30≦H<50m 15≦H<30m H<15m i≥70°	٧	
			dip	45°≦i<70° i<45°	٧	
Anomaly	piping fallen	ce collapse small fallen rock, gully, erosion, hole, substitee, heaving, bending of tree root, tree, crack, open crack, anomaly of ermeasure	ce no	٧		

[Countermeasure]

[Disaster type]]
Rock fall	
Slope failure	
[Main check o	bject]
Cut slope	
Natural slope	\checkmark

Type of countermeasures	
Culvert has been constructed along the slope failure	
Effectiveness of existing countermeasures	Check
Potential slope failure are prevented enough, or, it is defended enough when it is generated.	
Potential slope failure are considerably prevented, or it is considerably defended when it is generated.	
Potential slope failure are partly prevented, or it is partly defended when it is generated. However, it is not enough for the remaining factors.	
There is no countermeasure, or there is not effective even if countermeasures are not performed.	٧

[History]

Level of disaster history	Check
There is a history about large fallen rocks and slope failures that were obstacles to the road traffic after construction of recent measures.	
There is a history about large fallen rocks and slope failures that gets to the road though there is no obstacle to traffic.	
There is a history about small fallen rocks and slope failures that did not get to the road.	
No disaster records	√

[Expected size of disaster](width, length, depth, etc.)

L= 400 m, W= 350 m, D = 56 m

[Evaluation Rank]

Scale of disaster		Medium	Small
Great risk	1	2	3
Medium risk	1	2	3
Low risk	2	3	4

Organization responsible for countermeasure works according to the scale of the disaster

- -Big: Grant aid
- -Medium: Major contractor in Pakistan
- -Small: Local contractor

[Description]

This slope failure is located about 100 meters away from the N-15. It is an active slope failure of loose material composed of boulder, cobble, gravel, sand and silt. On the back of the slope failure steep cliff is comprised of metamorphic rocks. Any impact to damage the road from the slope failure has not been observed. On the right side of the slope failure man made terraces has been formed. Active erosion on the slope leads to the development of the gullies. A retaining wall is built to protect the road, however, no mitigation measures have been taken to stabilize the slope failure. The slope failure is not being considered to endanger the road.

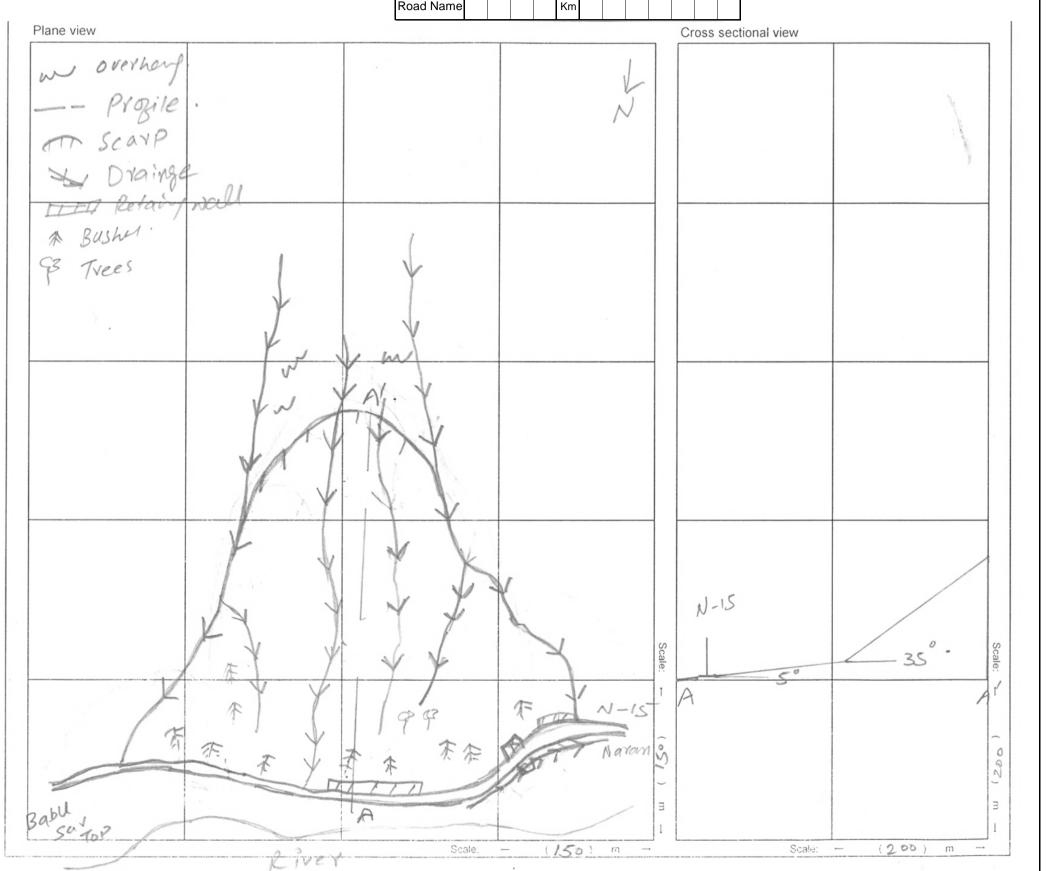
Influence on the traffice when potential disaster

- -Great risk: road closed for 2 days or more
- -Medium risk: road closed for 1 day or less
- -Low risk: no road closure

Code no.	Sat_	Ν	1	5	_	2	4	
Region Office								
Maintenance Unit								

Coordinates	Latitude			34° 56' 19.9"								
Coordinates	Longitude			73° 50' 59.7"								
Road Name					Km							

Date	2018/6/22
Inchestor	Yasir, Basharat, Shafiq,
Inspector	Saiid



Code no.	Sat	N	1	5		2	4
					_		
Region Office							
Maintenance Unit							

Coordinates	Latitude		34º 56' 19.9"						
Coordinates	Longitud	73° 50' 59.7"							
Road na					Km				

Date	2018/6/22			
Inspector	Yasır, Basharat, Shafıq, Saiid			







Full view of the landslide

View of landslide on Valley side:

Road condition:Cut slope at the start point







View of the slope failure at the middle point

Existing countermeasures / anomalies

View of Box Culvert at the toe of slope

Code no.	Sat	_	Ν	1	5	3	4	
Region Office								
Maintenance Unit								

Coordinates	Latitude Longitude			34° 58' 15.8"								
Coordinates				le	73° 55' 37.1"							
Road Name					Km							

Date	2018/6/23
Inspector	Yasir, Basharat, Shafiq, Sajid

[Causes]

Caus			
item	factor	category	Check
er	areas that river bed is 15°	0.50km ² or more	٧
٠į	or more in watershed	0.15km² - 0.50km²	
/ of	area	less than 0.15km ²	
Property of river		40°or more	
rop	steepest slope of river bed	30° - 40°	
Д		less than 30°	٧
	area that alone gradient is 200	0.20km ² or more	
	area that slope gradient is 30° or more in watershed area	0.08km² - 0.20km²	
	or more in materialist and	less than 0.08km ²	٧
)e	area that meadow and shrub	0.20km ² or more	
slop	(less than 10m height)	0.02km² - 20km²	
Property of slope	occupy in watershed area	less than 0.02km ²	٧
ərty	artificial works that cause	certain	
edo.	negative effects	none	٧
Pı	new crack and/or slope	certain	
	failure in stream	none	٧
	traces of large slope	certain	٧
	failure in stream	none	

[Road structure]

L. re ere e	ractarcj	
structure	category of score	Check
River width	10m or more 5m - 10m 3m - 5m less than 3m	V
Doam	less than 1m or No bridge / box culvert 1m - 2m 2m - 3m 3m - 5m 5m or more	V

[Potencial disaster mode]	Check
Damage of bridge/culvert	
Outflow of embankment	
Debris flooding on the road	٧

[History]

category of score	Check
There is a history about debris flow that were obstacles to the road traffic after construction of recent measures.	٧
There is a history about debris flow though there is no obstacle to traffic.	
There is no history of debris flow	

[Expected size of disaster] (width, length, depth, etc.)

L= 600m, W= 70m, D= 4-5 m

[Countermeasure]

Type of countern	Check	
	none · lov	N V
Effect of existing	moderat	е
countermesure	high	
	enough	

[Evaluation Rank]

Scale of disaster Risk	Big	Medium	Small
Great risk	(1)	2	3
Medium risk	1	2	3
Low risk	2	3	4

Organization responsible for countermeasure works according to the scale of the disaster

- -Big: Grant aid
- -Medium: Major contractor in Pakistan
- -Small: Local contractor

Influence on the traffice when potential disaster

- -Great risk: road closed for 2 days or more
- -Medium risk: road closed for 1 day or les
- -Low risk: no road closure

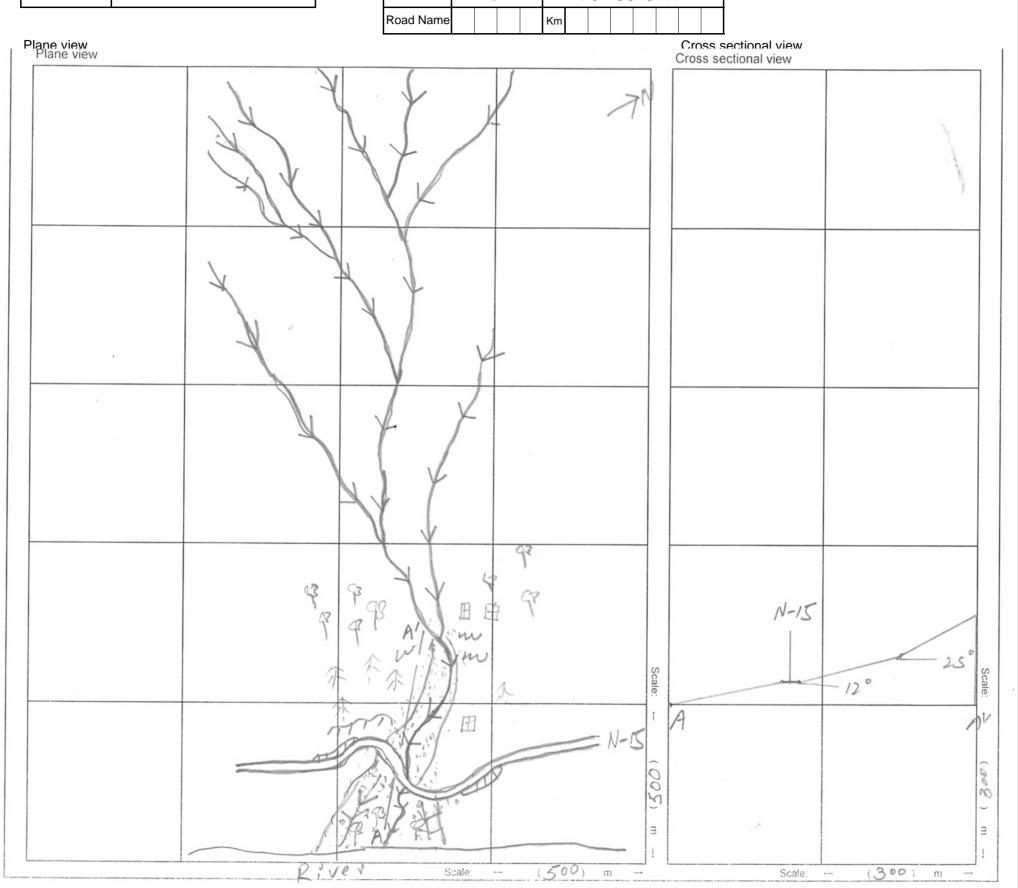
[Description/comments]

This is an active debris flow with large catchment area and flowing great amount of water. The debris is being mainly comprised of large boulders up to 5 m3 size. The loose material is present on both sides of the erosional channel. About 60 meters road has been damaged due to this debris flow. The debris flow has continuous water flowing on the road. A retaining wall is constructed to protect the road, however, no mitigation measures have been taken for the outflow of the water. To protect the road from this debris flow in the future, the construction of the bridge has been suggested for the outflow of debris material.

Code no.	Sat_	N	1	5	_	3	4	
Region Office								
Maintenance Unit								

Coordinates	Lati	tude		34º 58' 15.8"							
Coordinates	Long	gitude 730					55	5' 3	7.1	"	
Road Name				Km							

Date	2018/6/23					
nspector	Yasir, Basharat, Shafiq,					
орсског	Saiid					



Code no.	Sat_	N	1	5	_	3	4	
Region Office								
Maintenance Unit								

Coordinates		Lati	tude		34º 58' 15.8"		1					
Coordinates	Longitude		73º 55' 37.1"									
Road Name					Km							

Date	2018/6/23
Inspector	Yasir, Basharat, Shafiq, Sajid







Mountain side view of the debris flow

Valley side view of the debris flow

Front view of the debris flow







The boulder has been found along the debris flow

Road condition

Debris flowing on road

Code no.	Sat_	Ν	1	5	_ 53_1
Region Office					
Maintenance Unit					

Evaluation sheet (landslide)

	T T								 		
Coordinates	Latitude			itude 35° 4' 28.0"							
Coordinates	L	ong	itude	е	73° 56′ 17.9″						
Road Name					Km						

I	Date	2018/6/24
Ī	nspector	Basharat, Yasir, Sajid, Shafiq

[Main body of landslide]

1	3
Mountain side	
Valley side	
Both	٧

[Causes]

		Category	Check	
	D 1: () .	exist clearly		
	Result of photo interpretation	exist but partial and not clear		
-	interpretation	exist but not clear		
Topographical factor		large and new cracks, steps and subsidence		
Tactor	Surface	small and old cracks, steps and subsidence	٧	
	anomalies	slight deformation		
		no anomalies		
	0	fault, fracture zone	٧	
	Geological structure	dip slope		
	Structure	undip slope/ no characteristic feature	٧	
		metamorphic rock (schist, quartzite, phyllite etc.)	٧	
0	Main rock formation of	sedimentary rock (sandstone, limestone etc.)		
Geological conditions	landslide body	igneous rock (granite etc.)	٧	
conditions	landende sedy	quaternary deposit (colluvial deposit etc.)		
		much springs / much seepage		
	Hydrological	little springs /little seepage		
	feature	trace of water		
		no water observed	٧	

[History]

category			Check
	Existing record (documents or	obvious slight	٧
Records of	patrimony)	none	
Landslide	Damage on road facilities and	obvious	
		slight	٧
	houses	none	

[Countermeasure]

Category			Type of countermeasure
There is no countermeasure			
Effectiveness of countermeasure	No effect	٧	Retaining Wall has been
	Some effect		constructed
	High effect		

[Evaluation Rank]

Scale of disaster	Big	Medium	Small
Great risk	1	2	3
Medium risk	1	2	3
Low risk	2	3	4

Organization responsible for countermeasure works according to the scale of the disaster

Influence on the traffice when potential disaster

-Big: Grant aid

-Great risk: road closed for 2 days or more

-Medium: Major contractor in Pakistan

-Medium risk: road closed for 1 day or less

-Small: Local contractor

-Low risk: no road closure

[Expected size of disaster] (width, length, depth, etc.)

 $L\!=1000m$, $W\!=60m$, $D\!=70~m$

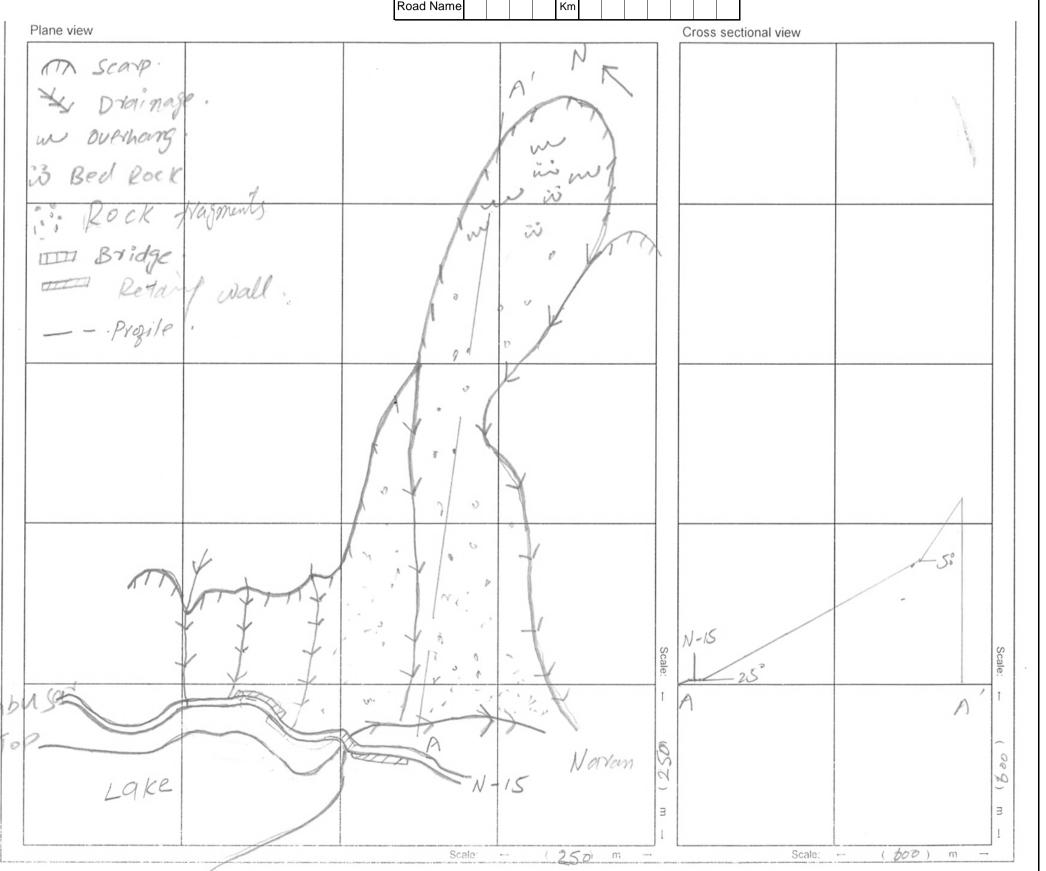
[Description]

This is an old rock avalanche which triggered due to any tectonic activity in the ancient time. It is presumed the rock avalanche has blocked the stream and created a lake which is known as Lalusar Lake. A channel has been constructed for the outflow of the water from the lake. The rock avalanche material is mainly composed of granite and granite gneisses. The huge boulders are present at the site up to more than 10 m3 sizes. Presently, this rock avalanche has no impact on the road, however, in future if rock avalanche material will be remoblized it may block the water channel and disrupt the road. A retaining wall has been constructed to protect the road.

Code no.	Sat_	Ν	1	5	_	53_1
Region Office						
Maintenance Unit						

Coordinates	Latitude				35° 4' 28.0"							
Coordinates		Longitude				73° 56' 17.9"					"	
Road Name					Km							

Date	2018/6/24
Inspector	Basharat, Yasir, Sajid, Shafiq
	Shallo



Code no.	Sat_	N	1	5	_	53_1
Region Office						
Maintenance Unit						

Coordinates	Lati	tude		35° 4' 28.0"							
Coordinates	ong	jitude	Э	73° 56' 17.9"							
Road Name				Km							

Date	2018/6/24
Inspector	Basharat, Yasır, Sajıd, Shafiq







Full view of the landslide

View of landslide on Valley side:

Road condition







View of the Landslide at the middle point

Existing countermeasures / anomalies: View of damaged Retaining Wall as counter measure

View of the toe of Landslide cut by the stream

Code no.	Sat	_	Ν	1	5	6	1	
Region Office								
Maintenance Unit								

Coordinates	Latitude				35° 05' 46.6"							
Coordinates	Longitude			73° 57' 17.0"								
Road Name					Km							

Date	2018/6/25
Inspector	Yasir, Basharat, Shafiq,
Поросто	Sajid

[Pagine]]

Caus	569]		
item	factor	category	Check
Property of river	areas that river bed is 15° or more in watershed area	0.50km ² or more 0.15km ² - 0.50km ² less than 0.15km ²	٧
Property	steepest slope of river bed	40° or more 30° - 40° less than 30°	٧
	area that slope gradient is 30° or more in watershed area	0.20km ² or more 0.08km ² - 0.20km ² less than 0.08km ²	٧
Property of slope	area that meadow and shrub (less than 10m height) occupy in watershed area	0.20km ² or more 0.02km ² - 20km ² less than 0.02km ²	٧
operty	artificial works that cause negative effects	certain none	٧
Ā	new crack and/or slope failure in stream	certain none	٧
	traces of large slope failure in stream	certain none	٧

[Road structure]

structure	category of score	Check
	10m or more	٧
River	5m - 10m	
width	3m - 5m	
	less than 3m	
	less than 1m or	٧
	No bridge / box culvert	
Beam	1m - 2m	
height	2m - 3m	
	3m - 5m	
	5m or more	

[Potencial disaster mode]	Check
Damage of bridge/culvert	
Outflow of embankment	
Debris flooding on the road	٧

[History]

category of score	Check
There is a history about debris flow that were obstacles to the road traffic after construction of recent measures.	٧
There is a history about debris flow though there is no obstacle to traffic.	
There is no history of debris flow	

[Expected size of disaster] (width, length, depth, etc.)

L= 1000 m, W= 40 m, D= 3-4 m

[Countermeasure]

Type of countern	Check	Κ	
	vert ng walls		
	none•lov		
Effect of existing	moderat	е	
countermesure	high		
	enough		

[Evaluation Rank]

Scale of disaster Risk	Big Medium		Small
Great risk	1	2	3
Medium risk	1	2	3
Low risk	2	3	4

Organization responsible for countermeasure works according to the scale of the disaster

- -Big: Grant aid
- -Medium: Major contractor in Pakistan
- -Small: Local contractor

Influence on the traffice when potential disaster

- -Medium risk: road closed for 1 day or les
- -Low risk: no road closure

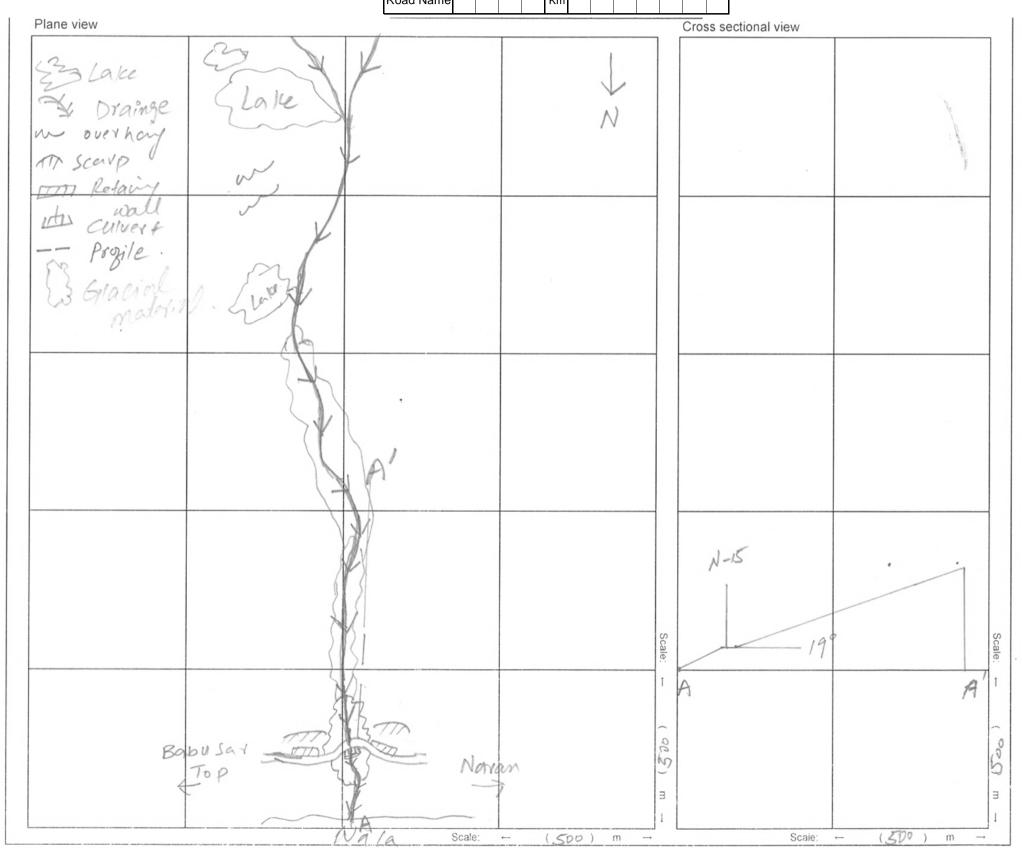
[Description/comments]

This is an active debris flow located at the sharp bend along N-15. Presently, the erosional channel is covered with glacier and road has been severely damaged. The debris flow has very large surface run off with steep gradient. The water seeps beneath the road and boulders ranges between 1-3 m3 are present in the channel towards valley side. Due to this steep gradient debris flow posing serious debris flow disaster which cause to damage the road and discontinuity of the traffic. A culvert is constructed for the out flow of the water, however, it does not fulfill the requirement. The active landslides were also observed both -Great risk: road closed for 2 days or more side of the river bed along the road posing risk to damage the road. A retaining wall is constructed to protect the road which has been damaged due to the debris flow. For the mitigation purpose, a culvert for the outflow of the water and debris material should be redesign and constructed.

Code no.	Sat_	Ν	1	5	_	6	1	
Region Office								
Maintenance Unit								

Lat Coordinates			tude		35° 05' 46.6'							3"		
Coordinates		ong	jitud	е	730				<u>" 1</u>	7.0	"			
Road Name					Km									

Date	2018/6/25					
Incocator	Yasir, Basharat, Shafiq,					
Inspector	Saiid					



Code no.	Sat_	N	1	5	_	6	1	
Region Office								
Maintenance Unit								

Coordinates	Latitude				35º 05' 46.6"							
Coordinates		Longitude				73° 57' 17.0"						
Road Name					Km							

Date	2018/6/25
Inspector	Yasir, Basharat, Shafiq, Sajid







Mountain side view of the debris flow

Valley side view of the debris flow

Culvert outlet







The boulder has been found along the debris flow

Road condition

Existing countermeasures / anomalies:Retaining wall has been constructed along the Debris Flow

Code no.	Sat	_	Ν	1	5	75_1
Region Office						
Maintenance Unit						·

Coordinates	La	titu	de		(3)	5°	1	5'	36	3.6)"	
Coordinates	Lo	ngi	ituc	le	7	'4°	0	5'	28	3.1	"	
Road Name					Km							

2018/6/27 Date Yasir, Basharat, Shafiq, Inspector Sajid

[Pagine]]

Caus			01 1
item	factor	category	Check
e	areas that river bed is 15°	0.50km ² or more	٧
	or more in watershed	0.15km² - 0.50km²	
/ of	area	less than 0.15km ²	
ert		40°or more	
rop	steepest slope of river bed	30° - 40°	٧
Д.		less than 30°	
		0.20km ² or more	٧
	area that slope gradient is 30° or more in watershed area	0.08km² - 0.20km²	
	or more in waterened area	less than 0.08km ²	
96	area that meadow and shrub	0.20km ² or more	
slop	(less than 10m height)	0.02km² - 20km²	
o to	occupy in watershed area	less than 0.02km ²	٧
ərty	artificial works that cause	certain	
Property of slope	negative effects	none	٧
P	new crack and/or slope	certain	٧
	failure in stream	none	
	traces of large slope	certain	٧
	failure in stream	none	

[Road structure]

[INDAG 31	•	
structure	category of score	Check
	10m or more	٧
River	5m - 10m	
width	3m - 5m	
	less than 3m	
	less than 1m or	
	No bridge / box culvert	٧
Doam	1m - 2m	
	2m - 3m	
	3m - 5m	
	5m or more	

[Potencial disaster mode]	Check
Damage of bridge/culvert	
Outflow of embankment	
Debris flooding on the road	٧

[History]

category of score	Check
There is a history about debris flow that were obstacles to the road traffic after construction of recent measures.	٧
There is a history about debris flow though there is no obstacle to traffic.	
There is no history of debris flow	

[Expected size of disaster] (width, length, depth, etc.)

L= 1000 m, W= 45m, D= 7-8 m

[Countermeasure]

Type of countern	neasure	Check
Retainir	ng walls	
	none · lov	
Effect of existing	moderat	е
countermesure	high	
	enough	

[Evaluation Rank]

Scale of disaster Risk	Big	Medium	Small
Great risk	(1)	2	3
Medium risk	1	2	3
Low risk	2	3	4

Organization responsible for countermeasure works according to the scale of the disaster

- -Big: Grant aid
- -Medium: Major contractor in Pakistan
- -Small: Local contractor

Influence on the traffice when potential disaster

- -Low risk: no road closure

[Description/comments]

This is an active debris flow along N-15. The debris flow event occurred in July 2017 due to very heavy rainfall in the area. The debris flow origin from the cliff and lead to a serious debris flow disaster. According to the local inhabitant, three vehicles and local irrigation system have been damaged and road has been blocked more than a week. After one week the material has been removed from the road for the continuity of the traffic. The debris flow has very long run-out and transported a huge debris material which covered the entire road section. Still huge material is deposited along the road site. Large size of the boulders ranges between 1-5m3 are present at the site. The boulders are comprised gabbro diorite and graniti rocks. It has been observed the debris flow is drained by the seasonal water. The gradient of -Great risk: road closed for 2 days or mor the erosional channel is very steep and lead to potential in future disaster and significant damage of the road. The area is still very unstable and there is a high potential for more -Medium risk: road closed for 1 day or les events occur. In future, there is possibility this debris flow block the Thak Nala and create a landslide dam. A retaining wall is constructed to protect the road which has been damaged due to this debris flow. For the mitigation purpose the construction of shed has been suggested to protect the road in the future.

Code no.	Sat_ N 1	5 _ 75_1		Sketc	n sheet		Date	2018/6/27
Region Office		0 _ · •_ ·		Latitude	35° 15' 3	36.0"	Inspector	Yasir, Basharat, Shafiq
Maintenance Unit			Coordinates	Longitude	740 05' 2		<u>.</u>	Saiid
			Road Name		Km			
Plane view						Cross section	onal view	
¥.	mase.		Val.	~	11/			
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w	over more		N.V.					1
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	Dyainage. overhang. Trees Lop field Debvis ma louses Retainly	wew.	8					
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	chilas		100		Babusar	2		
		L	1		TOP	3		
			Nata	-	7	1		

Code no.	Sat_	N	1	5	_	75_1
Region Office						
Maintenance Unit						

Coordinates	Lati	tude		35º 15' 36.0"				ı			
Coordinates	Longitude				74 ⁰	05	5' 28	3.1"	'		
Road Name				Km							

Date	2018/6/27
Inspector	Yasir, Basharat, Shafiq, Sajid







Mountain side view of the debris flow

Valley side view of the debris flow

Mid view of the debris flow







The Check dams has been built along the debris flow

Road condition

Existing countermeasures / anomalies:Retaining Wall has been constructed along the Debris Flow

Code no.	Sat	_	Ν	1	5	_	75_	_2
Region Office								
Maintenance Unit								

Evaluation sheet (debris flow)

Coordinates	Latitude			35° 15' 40.2"							
Coordinates		Longitude			74° 05' 28.2"						
Road Name					Km						

Date 2018/6/28 Inspector Yasir, Basharat, Shafiq, Sajid

[Causes]

Caus			a
item	factor	category	Check
ē	areas that river bed is 15°	0.50km ² or more	٧
.≧	or more in watershed	0.15km ² - 0.50km ²	
Property of river	area	less than 0.15km ²	
ert		40°or more	
rop	steepest slope of river bed	30° - 40°	٧
۵		less than 30°	
	area that alone areadient is 200	0.20km ² or more	٧
	area that slope gradient is 30° or more in watershed area	0.08km ² - 0.20km ²	
	or more in materials and	less than 0.08km ²	
oe Je	area that meadow and shrub	0.20km ² or more	
lols	(less than 10m height)	0.02km² - 20km²	
Property of slope	occupy in watershed area	less than 0.02km ²	٧
erty	artificial works that cause	certain	
ορ	negative effects	none	٧
ď	new crack and/or slope	certain	٧
	failure in stream	none	
	traces of large slope	certain	٧
	failure in stream	none	

[Road structure]

[INDau 3	iruoturej	
structure	category of score	Check
River	10m or more 5m - 10m	٧
width	3m - 5m	
	less than 3m	
	less than 1m or	
	No bridge / box culvert	٧
Beam	1m - 2m	
height	2m - 3m	
	3m - 5m	
	5m or more	

[Potencial disaster mode]	Check
Damage of bridge/culvert	
Outflow of embankment	
Debris flooding on the road	٧

[History]

category of score	Check
There is a history about debris flow that were obstacles to the road traffic after construction of recent measures.	٧
There is a history about debris flow though there is no obstacle to traffic.	
There is no history of debris flow	

[Expected size of disaster] (width, length, depth, etc.)

L= 600 m, W= 54 m, D= 7-8 m

[Countermeasure]

Type of countern	Check	
No Counte	er Measure	
	none-lo	
Effect of existing	moderat	е
countermesure	high	
	enough	

[Evaluation Rank]

[Evaluation reality			
Scale of disaster Risk	Big	Medium	Small
Great risk	1	2	3
Medium risk	1	2	3
Low risk	2	3	4

Organization responsible for countermeasure works according to the scale of the disaster

- -Big: Grant aid
- -Medium: Major contractor in Pakistan
- -Small: Local contractor

Influence on the traffice when potential disaster

- -Great risk: road closed for 2 days or more
- -Medium risk: road closed for 1 day or les
- -Low risk: no road closure

[Description/comments]

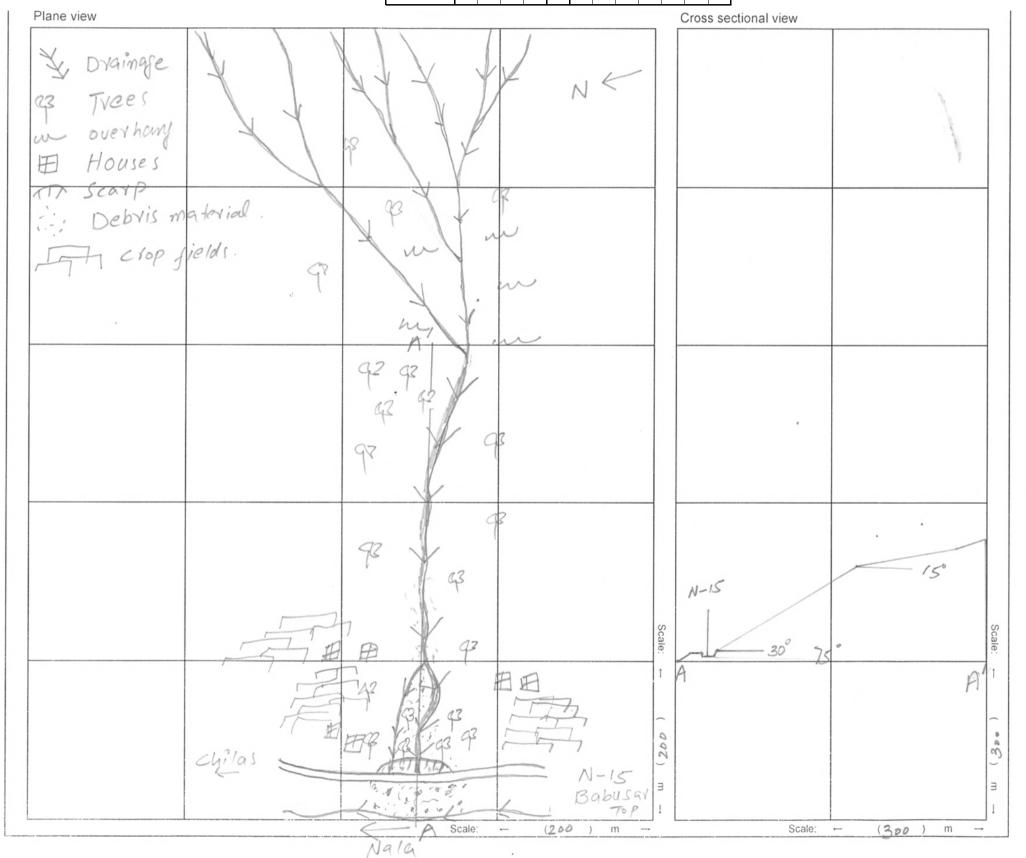
This active debris flow also occurred in July 2017 during heavy rainfall at the 100 meters away from the previous location. The debris flow leads to similar disaster as N-15-75-1. Due to this debris flow about 60 meters road has been partially damaged. The source of the debris flow has very steep cliff. The debris flow comprises two water channel, however, both channels have been drained by seasonal water. The erosional channel has a very steep gradient. Detached boulders of the size range between 1-5m3 was present in the channel and large number of boulders are still hanging along the road that lead to further disaster. The area is still very unstable and there is a high potential for more events occur. Due to the recent debris flow no mitigation measures have been taken to protect the road. Therefore, construction of shed is suggested to protect the road in the future.

Code no.	Sat_	Ν	1	5	_	75_2
Region Office						
Maintenance Unit						

Sketch sheet

		itude		35º 15' 40.2"							
Coordinates	Long	gitud	е		74° 05' 28.2"						
Road Name				Km							

Date	2018/6/28
Inchestor	Yasir, Basharat, Shafiq,
Inspector	Saiid

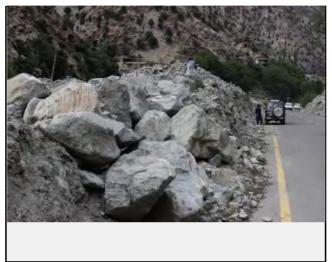


Code no.	Sat_	N	1	5	_	75_2
Region Office						
Maintenance Unit						

Coordinates	Latitude				35º 15' 40.2"							
Coordinates		Longitude			74º 05' 28.2"							
Road Name					Km							

Date	2018/6/28
Inchestor	Yasir, Basharat, Shafiq,
Inspector	Sajid







Mountain side view of the debris flow

Valley side view of the debris flow

Mid view of the debris flow







The Check dams has been built along the debris flow

Road condition

Existing countermeasures / anomalies: No Counter Measure

Code no.	Sat	_	N	1	5	_	7	8	
Region Office									
Maintenance Unit									

Evaluation sheet (debris flow)

Coordinates	Latitude				35° 21' 18.8"							
Coordinates	Longitude			le	74° 08' 18.8"							
Road Name					Km							

Date 2018/6/29 Inspector Yasir, Basharat, Shafiq, Sajid

[Causes]

Caus			011-
item	factor	category	Check
Property of river	areas that river bed is 15° or more in watershed	0.50km ² or more 0.15km ² - 0.50km ²	٧
Ē.	area		
> 0	aica	less than 0.15km ²	
ert		40°or more	
l ob	steepest slope of river bed	30° - 40°	
а.		less than 30°	٧
	area that alone gradient is 20°	0.20km ² or more	٧
	area that slope gradient is 30° or more in watershed area	0.08km² - 0.20km²	
		less than 0.08km ²	
96	area that meadow and shrub	0.20km ² or more	
lols	(less than 10m height)	0.02km ² - 20km ²	
ō	occupy in watershed area	less than 0.02km ²	٧
Property of slope	artificial works that cause	certain	٧
ō	negative effects	none	
٩	new crack and/or slope	certain	
	failure in stream	none	٧
	traces of large slope	certain	
	failure in stream	none	٧

[Road structure]

structure	category of score	Check
	10m or more	٧
River width	5m - 10m	
	3m - 5m	
	less than 3m	
	less than 1m or	
	No bridge / box culvert	٧
Beam	1m - 2m	
height	2m - 3m	
	3m - 5m	
	5m or more	

[Potencial disaster mode]	Check
Damage of bridge/culvert	
Outflow of embankment	
Debris flooding on the road	٧

[History]

category of score	Check
There is a history about debris flow that were obstacles to the road traffic after construction of recent measures.	٧
There is a history about debris flow though there is no obstacle to traffic.	
There is no history of debris flow	

[Expected size of disaster] (width, length, depth, etc.)

L= 600m, W= 60 m, D= 3-4 m

[Countermeasure]

Type of counterm	neasure	Check
No Counte	r Measure	
Effect of existing	none · lo	
countermesure	high enough	

[Evaluation Rank]

Scale of disaster Risk	Big	Medium	Small
Great risk	1	2	3
Medium risk	1	2	3
Low risk	2	3	4

Organization responsible for countermeasure works according to the scale of the disaster

- -Big: Grant aid
- -Medium: Major contractor in Pakistan
- -Small: Local contractor

Influence on the traffice when potential disaster

- -Great risk: road closed for 2 days or more
- -Medium risk: road closed for 1 day or les
- -Low risk: no road closure

[Description/comments]

This debris flow is located on N-15. It is an old debris flow with large catchment area. The unconsolidated debris material is present both sides of the erosional channel. A temporary house is constructed in the middle of the stream and is prone to disaster. No countermeasures have been taken to avoid the debris material on the road. Therefore the road has been damaged due to this debris flow. Presently water is not flowing in the stream, therefore, the stream has been drained by seasonal water. It is likely that future debris flow will continue on the road. For the mitigation purpose construction of the bridge or a culvert has been suggested for the

smooth outflow of the water and the debris material

ode no. Sat_ N 1 5 _ 7 8		Sketc	n sheet		Date	2018/6/29
egion Office		Latitude	35° 21'	' 18.8"	Inspector	Yasır, Basharat, Shafiq,
laintenance Unit	Coordinates-	Longitude	740 08			Saiid
	Road Name		Km			
Plane view	[110441141110]			Cross se	ctional view	
1						
1						
& Diamage	. W					1
Retains wall			K			
Li Crop fields.	1		N			\
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and overhang	K,					
ma toxical	~					
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		Scale: -	(300) m		Scale. +	- (300) m -

Code no.	Sat_	N	1	5	_	7	8	
Region Office								
Maintenance Unit								

	Coordinates	Lati	tude		35º 21' 18.8"							
		ong	itude	Э	74º 08' 18.8"							
	Road Name				Km							

Date	2018/6/29
Inspector	Yasir, Basharat, Shafiq, Saiid





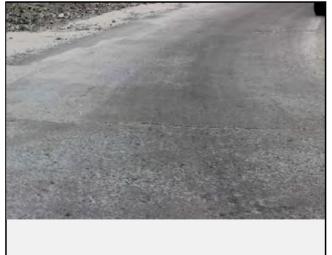


Mountain side view of the debris flow

Valley side view of the debris flow

Mid view of the debris flow







The Check dams has been built along the debris flow

Road condition

Existing countermeasures / anomalies:No Counter Measure. House has been damaged along the Debris Flow

Code no.	Ν	3	5	_	1					
Region Office	Abbottabad									
Maintenance Unit	Abbottabad									

Evaluation sheet (Slope failure/Rockfall)

1		<u> </u>											
	Coordinates	Latitude			N 34° 43' 8"								
	Coordinates	Longitude				E 73° 57' 52.6"							
	Road name	Ν	3	5		Km	1	7	3	+	2	0	0

Date	18-Dec-17
Inspector	Makoto Tokuda

[Causes]

÷	auses Item	factor	cat	tegory of score	Check
\vdash			_	0 ,	OHOOK
topography	Collapsed factor	talos slope, clear convex break of slope,		or more correspondences correspondences	./
ogre	ollapse factor	eroded toe of slope ,		correspondences	
top	ပ္ပ	overhang, water catchment slope		correspondence	
			ma		
	Soil	susceptible to erosion		ttle marked	
	Ñ	less strength with water	No		
ons			_	ırked	
diti	Rock	high density of cracks and a weak layers,			✓
con	Ro	susceptible to erosion, fast weathering		ttle marked	
cal		Tast weathering		ne	
Geological conditions	rre	dip slope of bedding plane	It c	orresponds. ne	✓
G	Structure	debris on impermeability bedrock,	ırked		
	Str	the upper part is a hard /the toe of slope is	a li	✓	
		weak.	No		
			ins	tability	
		Topsoil, detached rock and unsteady rock	a li	ttle unstable	✓
'n			sta	bility	
Surface codition			no		
00 e		Spring water	se		
face			no	✓	
Sur			ba	re land with minor vagetation	√
		Surface condition	I	ermediate (bare · grass · tree)	
				inly structure, mainly tree	
				H≧50m	
			ight	30≦H<50m	
			heig	15≦H<30m	
Profile		Height (H), dip (i)	٢	H<15m	
Pro		ricigit (ri), dip (i)	_	i≧70°	
			dib	45°≦i<70°	
			٥	45 ≧1 \ 70 i < 45°	
\vdash			2 -		
yاد		e collapse, small fallen rock, gully, eroson,		r more correspondences clarity	✓
Anomaly		hole, subsidence, heaving, bending of tree root, tree, crack, open crack, anomaly of		rtain•unclarity	
An		ermeasure	no	ne	
		-			

_					
Cou	nta	rm	22	CII	rΔ
Ouu	шс				

[Disaster type]						
Rock fall	1					
Slope failure	1					
[Main check of	bject					
Cut slope	1					
Natural slope						

Type of countermeasures							
Retaining wall (with steel piping), shotcrete							
Effectiveness of existing countermeasures	Check						
Potential slope failure are prevented enough, or, it is defended enough when it is generated.							
Potential slope failure are considerably prevented, or it is considerably defended when it is generated.							
Potential slope failure are partly prevented, or it is partly defended when it is generated. However, it is not enough for the remaining factors.	1						
There is no countermeasure, or there is not effective even if countermeasures are not performed.							

[History]

Level of disaster history	Check
There is a history about large fallen rocks and slope failures that were obstacles to the road traffic after construction of recent measures.	
There is a history about large fallen rocks and slope failures that gets to the road though there is no obstacle to traffic.	1
There is a history about small fallen rocks and slope failures that did not get to the road.	
No disaster records	

[Expected size of disaster](width, length, depth, etc.)

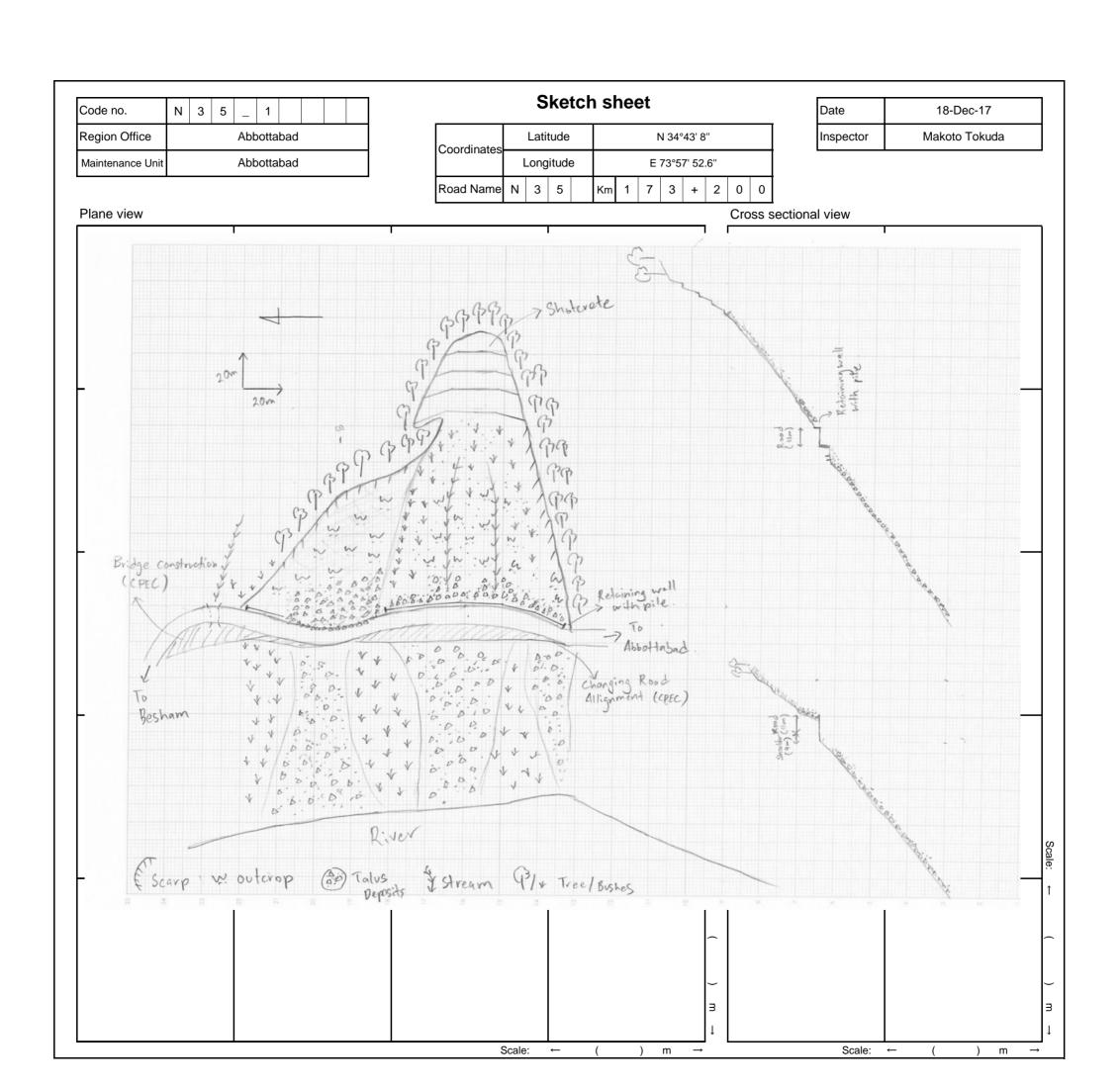
100m(w)*60m(h)*1m(d)=6,000m3 Rock fall max size: 2m*2m*1.5m=6m3

[Hazard]

	A: the possibility of collapse/fall is high	
Hazard rank	B: the possibility of collapse/fall is moderate	>
	C: the possibility of collapse/fall is low/none	

[Description]

The existing countermeasure (shotcrete) was outsourced by the NHA to Frontier Works Organization (FWO) after the first collapse (five years ago). New collapse was confirmed at the side of the first collapse since three years ago. The talus deposit is covering part of the road but the are no traffic obstacle. Some treatment to the new slope maybe required. CPEC is currently shifting the road allignment to the valley side. Optical fibre cable is buried 1m at the mountain side of the road.



Code no.	N	3	5	_	1				
Region Office		Abbottabad							
Maintenance Unit		Abbottabad							

Coordinates		Latitude				N 34°43' 8"						
Coordinates	Longitude					Е	73°5	7' 52.	.6"			
Road Name	N	3	5		Km	1	7	3	+	2	0	0

Date	18-Dec-17
Inspector	Makoto Tokuda



Mountain side: Outcrop and bushes can be observed on the body of the slope.



Valley side: Talus deposit can be observed on the valley side of the slope



Road condition: Construction on shifting the road allignment to the valley side is being carried out by CPEC.



Existing countermeasures : Shotcrete was undertaken by FWO on the head of the slope to minimize the surface erosion.



Existing countermeasures: Retaining wall (with piling) constructed at the toe of the slope.



Existing anomalies: New slope failure was confirmed at the side of the previous slope where the talus deposit covered a part of the road. Some treatment maybe necessary.

Code no.	Ν	3	5	_	2				
Region Office	Abbottabad								
Maintenance Unit				Ab	obo	ttab	ad		

Evaluation sheet (Slope failure/Rockfall)

Coordinates	Latitude			N 34° 44' 51.9"								
Coordinates	Longitude				Ε	72°	57	7' 5.	.7"			
Road name	Ν	3	5		Km	1	7	8	+	7	0	0

Date	18-Dec-17
Inspector	Makoto Tokuda

[Causes]

I	tem	factor	ca	tegory of score	Check	
topography	Collapsed factor	tales slope, clear convex break of slope, eroded toe of slope , overbang, water catchment slope	3 c 2 c 1 c	✓		
S	Soil	susceptible to erosion less strength with water	ma a li	correspondence arked ittle marked one	✓	
Geological conditions	Rock	high density of cracks and a weak layers, susceptible to erosion, fast weathering		marked a little marked None		
eologic	rre	dip slope of bedding plane		It corresponds.		
Э	Structure	debris on impermeability bedrock, the upper part is a hard /the toe of slope is weak.	ma a li No	✓		
on		Topsoil, detached rock and unsteady rock	ins a li sta	✓		
Surface codition		Spring water	no se	√		
Sur		Surface condition	ba inte	✓		
Profile		Height (H), dip (i)	dip height	H≧50m 30≦H<50m 15≦H<30m H<15m i≧70° 45°≦i<70°	✓ ✓	
Anomaly	piping fallen	ce collapse, small fallen rock, gully, erosion, hole, subsidence, heaving, bending of tree root, tree, crack, open crack, anomaly of ermeasure	2 o	i < 45° r more correspondences · clarity rtain · unclarity ne	√	

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Со	ıın	ıtΔ	rm	2	CI.	ırΔ

[Disaster type]	
Rock fall	\
Slope failure	\
[Main check o	bject]
Cut slope	\
Natural slope	
	Rock fall Slope failure [Main check o Cut slope

[Countermeasure]	
Type of countermeasures	
None	
Effectiveness of existing countermeasures	Check
Potential slope failure are prevented enough, or, it is defended enough when it is generated.	
Potential slope failure are considerably prevented, or it is considerably defended when it is generated.	
Potential slope failure are partly prevented, or it is partly defended when it is generated. However, it is not enough for the remaining factors.	
There is no countermeasure, or there is not effective even if countermeasures are not performed.	1

[History]	
Level of disaster history	Check
There is a history about large fallen rocks and slope failures that were obstacles to the road traffic after construction of recent measures.	
There is a history about large fallen rocks and slope failures that gets to the road though there is no obstacle to traffic.	
There is a history about small fallen rocks and slope failures that did not get to the road.	1
No disaster records	

[Expected size of disaster](width, length, depth, etc.)

20m(w)*10m(h)*1m(d)=200m3

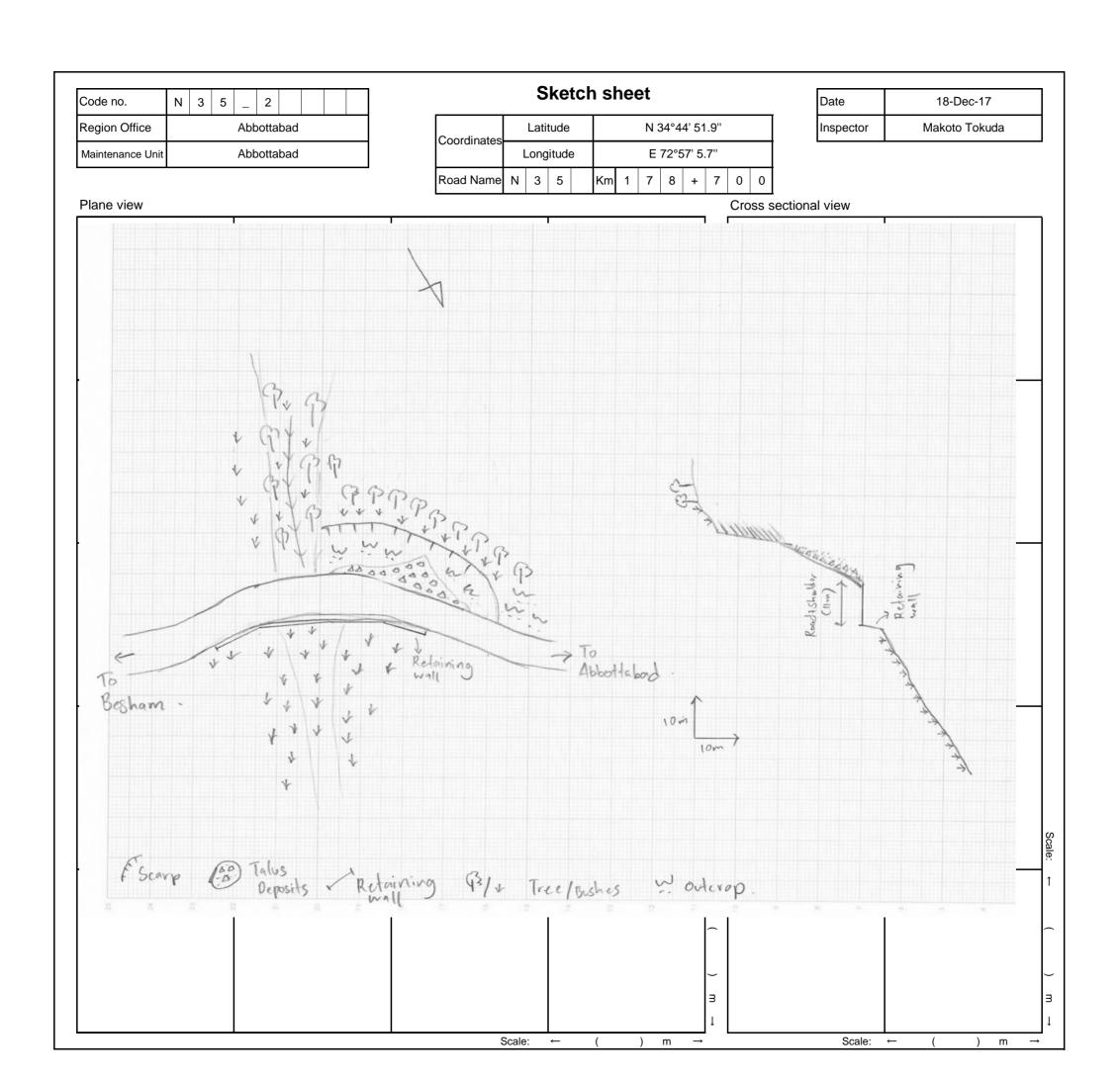
Rock fall max size: 2m*1m*1m=2m3

[Hazard]

[r luzuru]		
	A: the possibility of collapse/fall is high	
	B: the possibility of collapse/fall is moderate	
	C: the possibility of collapse/fall is low/none	V

[Description]

The disaster occurred beside the stream. This site is susceptible to both slope failure and rock fall. Talus and fallen rock can be osbserved at the toe of the slope. Vertical cracks can be seen at the outcrop which is resulting the rockfall. The retaining wall between road and the slope may minimize the potential of the road disaster. Optical fibre cable is buried 1m at the mountain side of the road.



Code no.	N	3	5	_	2				
Region Office	Abbottabad								
Maintenance Unit				Abb	otta	bad			

Coordinates		Lati	tude		N 34°44' 51.9"							
Coordinates		ong	itude	Э	E 72°57' 5.7"							
Road Name	N	3	5		Km	1	7	8	+	7	0	0

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Mountain side: Both slope failure and rock fall was observed at this site.

Valley side: The valley side is abundant with vegetation and no trace of slope failure was confirmed.

Road condition: No anomalies or damages was confirmed on the road though there was a small portion of talus deposit observed at the shoulder of the road.







Existing anomalies: Dip slope of bedding towards the road can be observed on the slope.

Existing anomalies: Unstable rocks can be observed ath the top part of the slope. The ctacks are also mostly vertical.

Existing anomalies: The size of the fallen rock is large enough to damage the road or cars.