APPENDIX E

DETAILED FIELD SHEETS

LANDSLIDE No. 00B

Detailed Study of Selected Natural Terrain Landslides at Cloudy Hill

LANDSLIDE SETTING

Mapped by	DMD	**Date**	30/11/01	**Weather**	Hot and Fine

1:1000 map sheet No	3-SW-19D/24B	**Grid reference**	E835736	N837165
Catchment No	SE			
Landslide No	00B			
Year first observed	2000			
Evidence	First reproted to the GEO in April 2000			
Mapped geology	*Formation: Tai Mo Shan*	*Lithology: Undivided, coarse ash crystal tuff*		

Within Catchment	**Rock exposure**	**Break in slope**	**Ridgeline**	**Stream course**
Proximity of landslide source area to:	None	Concave break in slope at source mid point	5m SW from ridgeline	40m – 50m
Morphological position	Flank of a drainage channel			
Previous failure	Possible. Indicated by concave break in slope at mid point of source			
Anthropogenic features *(Paths, fires, drains etc)*	Area previously affected by fire c1986.			

SOURCE

VEGETATION ✔ relevant box

bare	Grass	✔ Low shrub + grass	Tall shrub + grass
low shrub	tall shrub	plantation / woodland	Hillfire

✔ all relevant boxes	**Angle**	**Aspect**	**Irregular**	**Convex**	**Concave**	**Planar**
Main scarp	60-70°	187°			✔	
Source floor	38-40°	178°				✔
Pre-failure Slope	35-40°	200°		✔		

Max width	23.6 m	**Max length**	47.8 m
Max depth	1.2 m		

Notes:
A 2.5m high concave break in slope comprising highly to moderately decomposed tuff with closely spaced joints may be indicative of the landslide occurring at the location of a previous landslide.

Detailed Study of Selected Natural Terrain Landslides at Cloudy Hill

SOURCE (Continued)

MATERIALS EXPOSED

Max. Thick.	Material Type	Material Description	% material by volume			
			>200 mm	60–200 mm	20–60 mm	<20 mm
1.1m	Fine Colluvium	Loose, light reddish brown silty SAND with some gravel and some to many angular cobbles of moderately decomposed tuff		30	20	50
0.2	CDT	Extremely weak light reddish brown completely decomposed tuff (slightly sandy SILT/CLAY with occasional gravel of quartz)			5	95

Regolith Type(s): Colluvium

STRUCTURAL DETAILS

Type	Dip	Dip Direction	Persistence	Spacing	Opening / Aperture	infill	Waviness	Roughness	Significance
J	28	175	1.5	-	-	-	Planar	Rough	Dipping out of slope
J	52	221	0.8	<100mm	-	-	Undulating	Smooth	Dipping out of slope
J	55	358	0.5	-	-	-	Planar	Rough	Dips into slope
J	85	221	1.9	<100mm	-	-	Undulating	Rough	Dips out of slope

SOIL PIPES * **Total Number** 0

Diameter										
Open										
Infilled										

Seepage *	Yes/No	Flow Rate	

** Mark locations of pipes and seepages on Sketch Plan*

NOTES / INITIATION:
- Probably triggered by a perched water table developing in the colluvium over the colluvium/decomposed tuff interface.
- Possible previous failure indicated by concave break in slope.

Detailed Study of Selected Natural Terrain Landslides at Cloudy Hill

DEBRIS TRAIL

SUBSTRATE

Max. Thickness	Material Type	Description
0.1	Top soil	Grey, slightly sandy CLAY/SILT
0.3	CDT	Extremely weak light reddish brown completely decomposed tuff (slightly sandy SILT/CLAY)
Regolith: Colluvium over CDT		

Debris Type	Description *	Clast / Matrix Supported	% by volume			
			>200 mm	60 – 200 mm	2-60 mm	<2mm
Colluvium	Light brown slightly sandy SILT/CLAY with much gravel and some angular cobbles of tuff up to 200mm in size	Matrix		15	25	60

** Include maximum clast size in Description*

Notes / Process:

Detailed Study of Selected Natural Terrain Landslides at Cloudy Hill

PHOTOGRAPHS

PLATE 1: View of Landslide Source and Debris Trail (Photograph Taken on 27 November 2000)

PLATE 2: View of Landslide Source (Photograph Taken on 30 November 2001)

LANDSLIDE No. 00B

Detailed Study of Selected Natural Terrain Landslides at Cloudy Hill

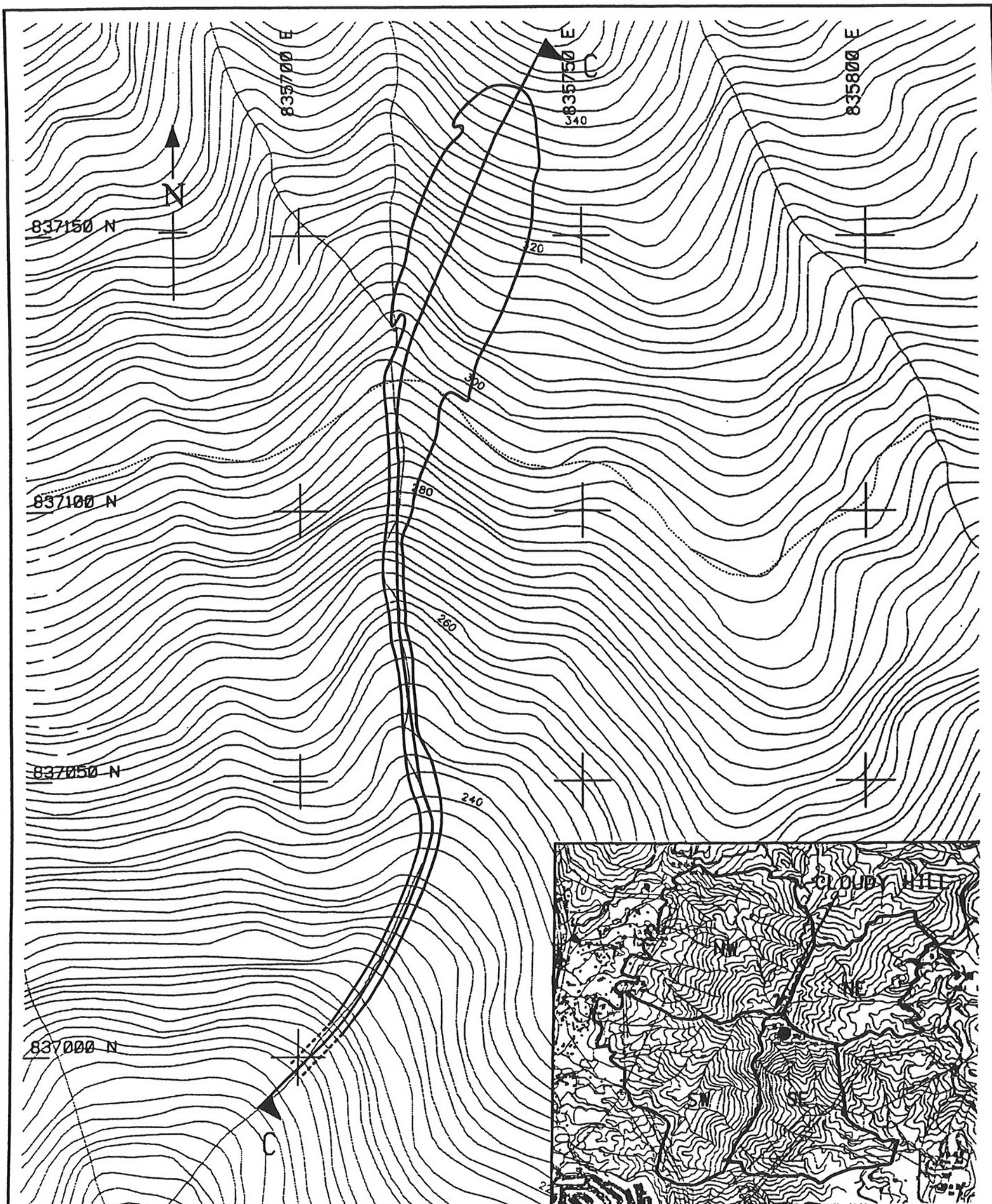


Figure 1 Location map (see Figure 5 for Section C-C) Scale 1:1000

Detailed Study of Selected Natural Terrain Landslides at Cloudy Hill

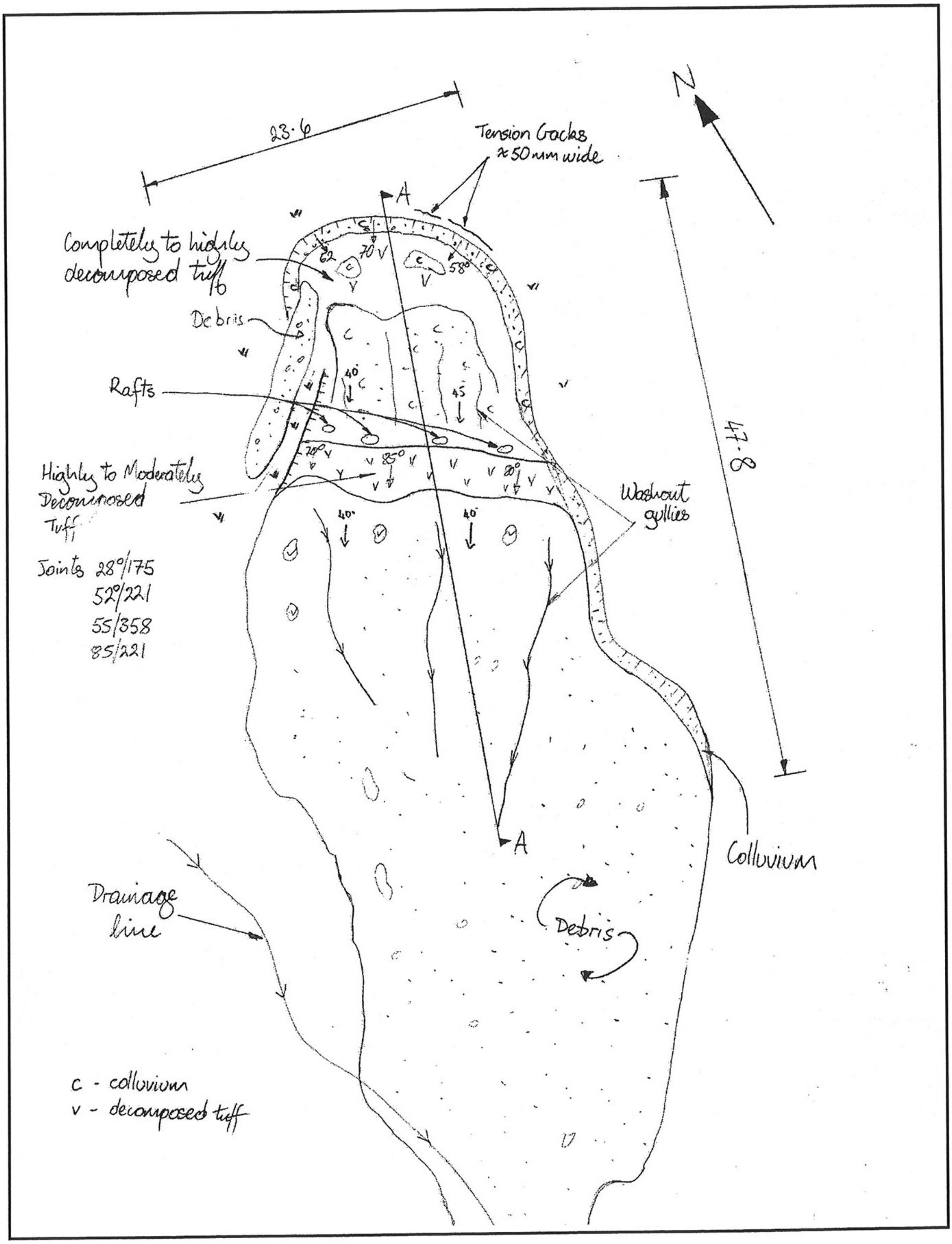


Figure 2 **Sketch plan of landslide source**

Detailed Study of Selected Natural Terrain Landslides
at Cloudy Hill

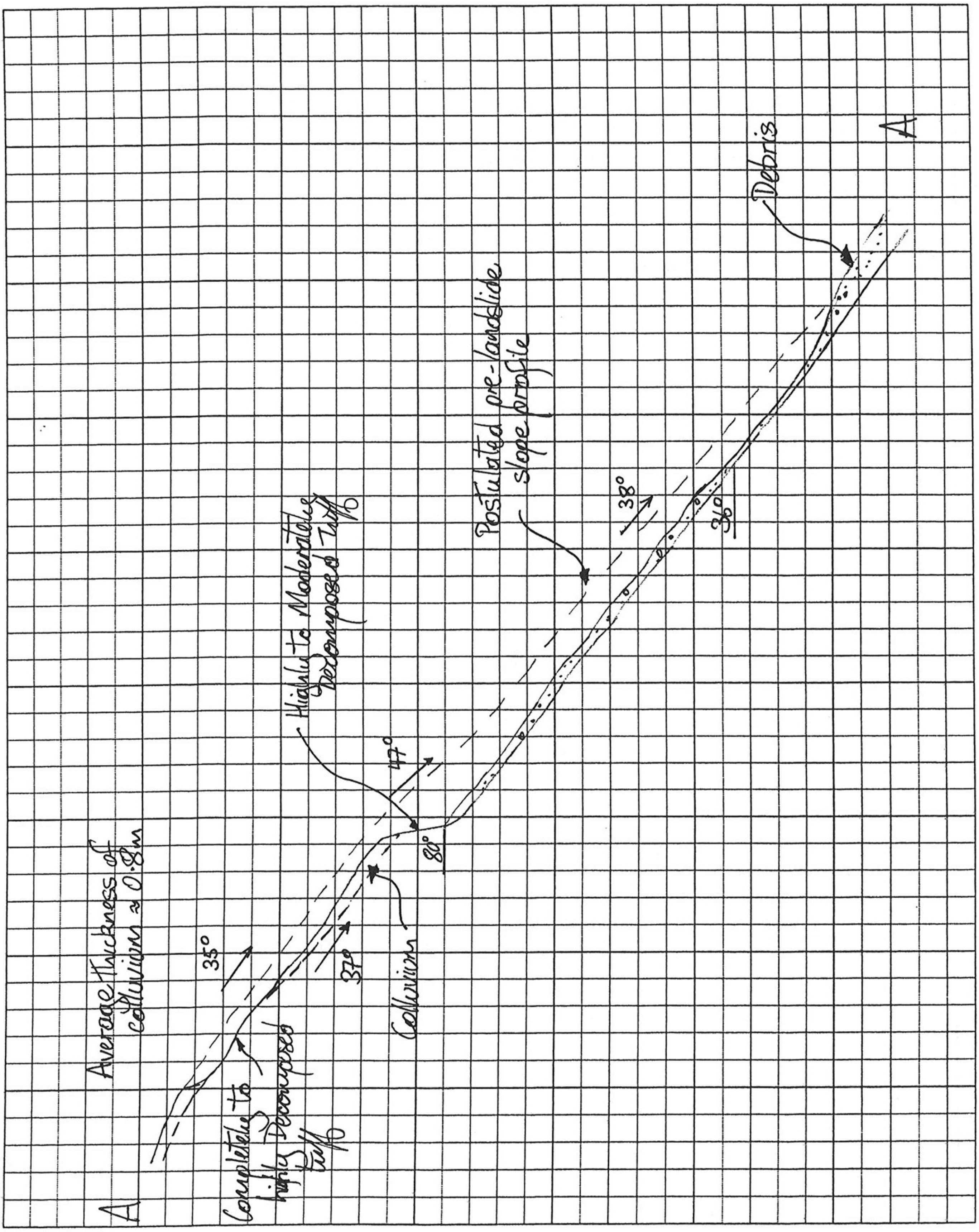


Figure 3 **Annotated sections through landslide source**

Detailed Study of Selected Natural Terrain Landslides at Cloudy Hill

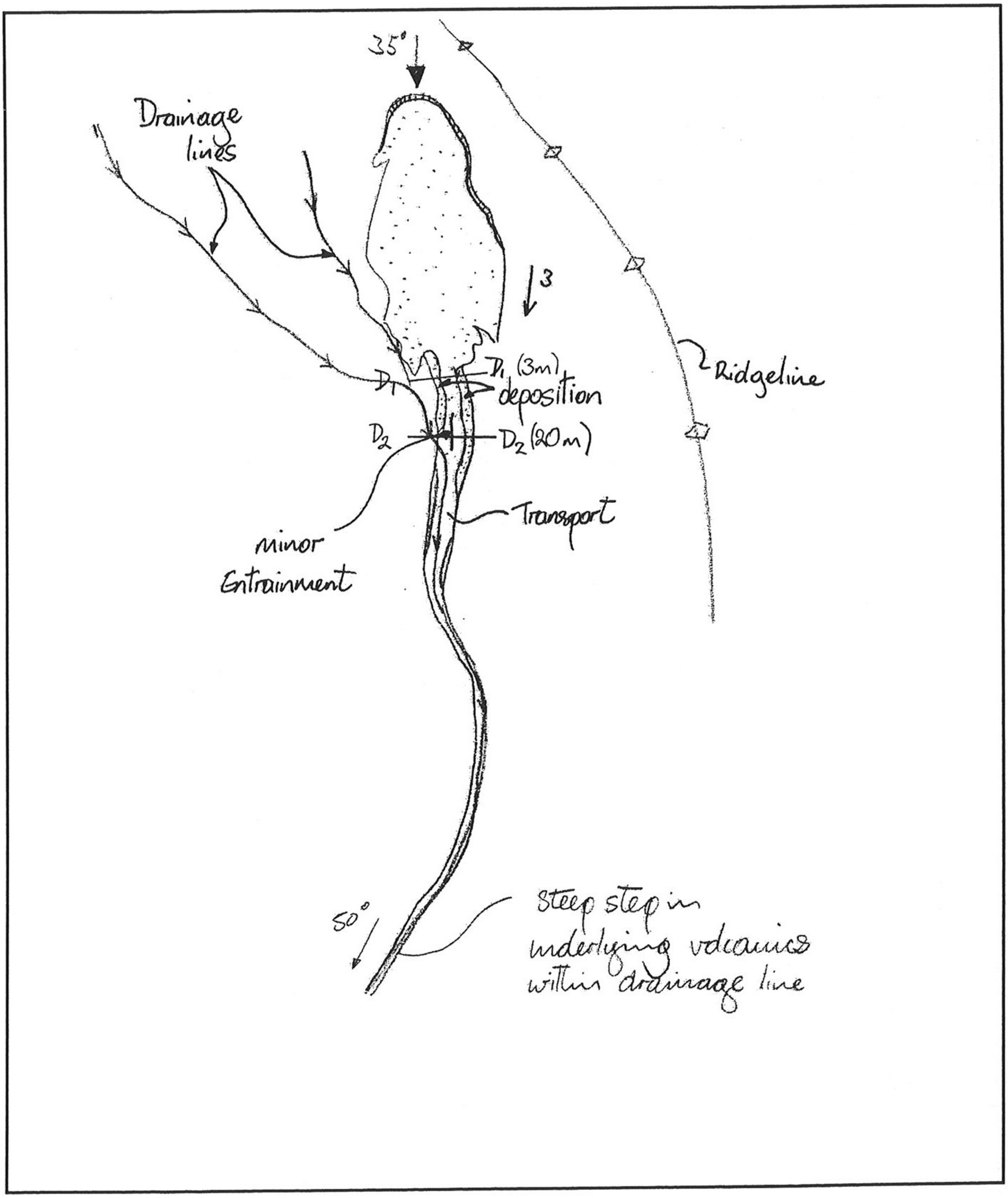


Figure 4 **Sketch plan of debris trail**

LANDSLIDE No. 00B

Detailed Study of Selected Natural Terrain Landslides at Cloudy Hill
Landslide Field Proforma

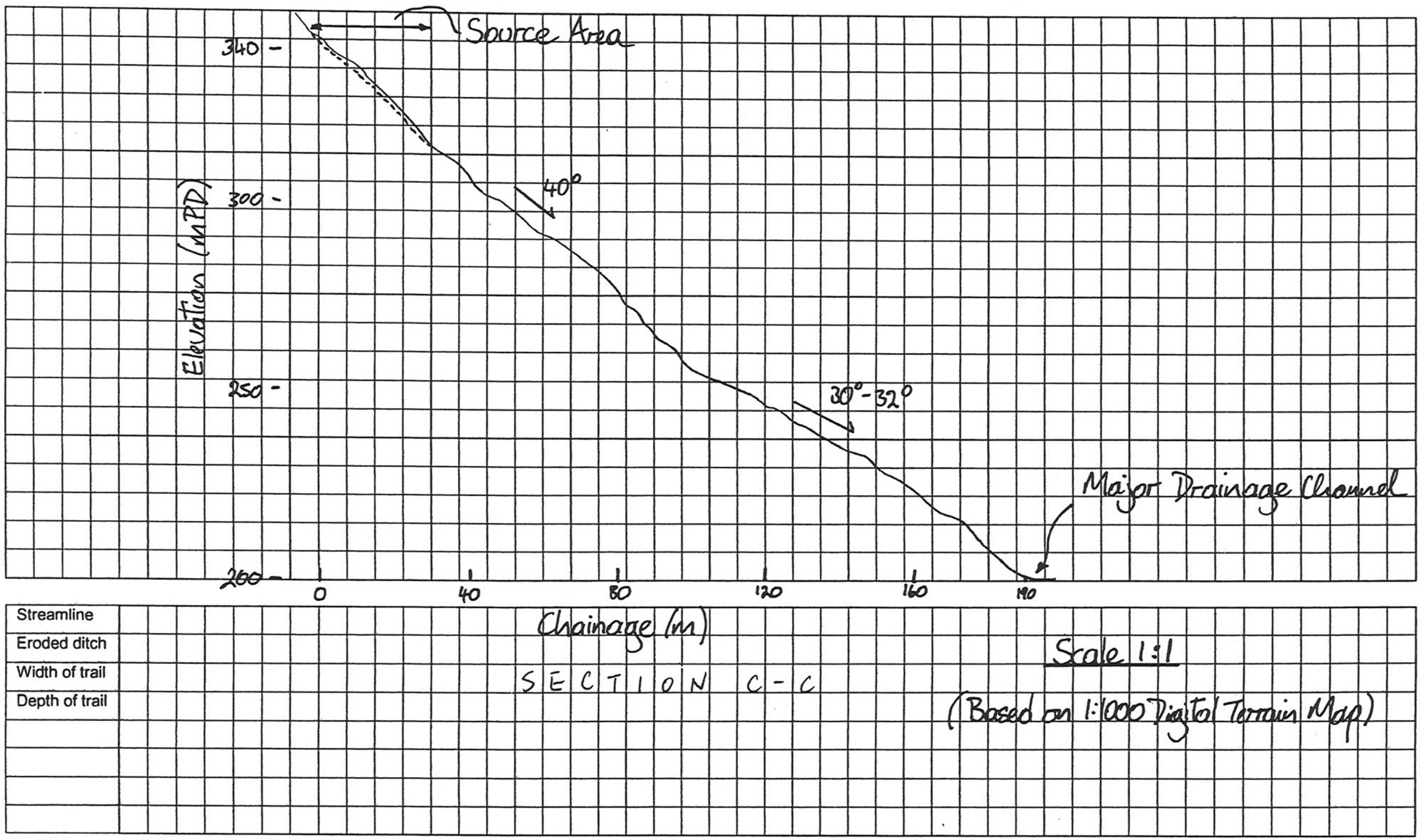


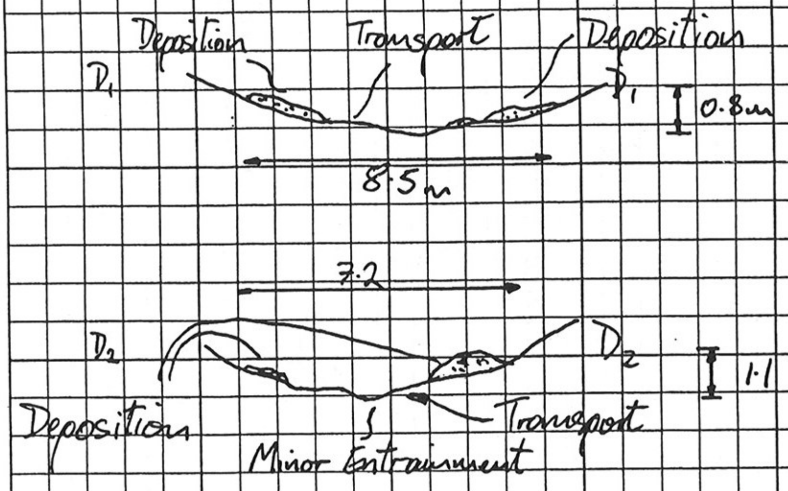
Figure 5 **Longitudinal Section though Debris Trail**

LANDSLIDE 00B

Detailed Study of Selected Natural Terrain Landslides at Cloudy Hill
Landslide Field Proforma

Chainage

3 m



20 m

Figure 6 **Sections through debris trail**

LANDSLIDE No. 00B

Detailed Study of Selected Natural Terrain Landslides at Cloudy Hill

Debris Trail

Chainage (m)	Slope Angle	Width of Trail (m)	Depth of Trail (m)	Deposition (m^3)	Material Deposited	Material Eroded (m^3)	MT Eroded	Max. Clast Diameter (m)	% Fines	Substrate
3	38	8.5	0.8	3.5	colluvium	-		>300 mm	60	Top Soil/CDT
20	38	7.2	1.1	2.5	colluvium	0.5	CDT	250 mm	55	Top Soil/CDT

LANDSLIDE No. 00C

Detailed Study of Selected Natural Terrain Landslides at Cloudy Hill

LANDSLIDE SETTING

Mapped by	DMD	**Date**	30/11/01	**Weather**	Hot and Sunny

1:1000 map sheet No	3-SW-24A	**Grid reference** GPS	E835525	N837091
Catchment No	SE			
Landslide No	00C			
Year first observed	2000			
Evidence	Visible after rainstorm in April 2000, and at Helicopter reconnaissance in July 2001			
Mapped geology	*Formation: Tai Mo Shan*	*Lithology: Undivided coarse ash crystal tuff*		

Within Catchment	**Rock exposure**	**Break in slope**	**Ridgeline**	**Stream course**
Proximity of landslide source area to:	50m south-east	Concave break in slope	50m	220
Morphological position	Head of Drainage Channel			
Previous failure	Possibly, due to convex break in slope possibly an area affected by previous failure.			
Anthropogenic features *(Paths, fires, drains etc)*	None apparent from site inspection.			

SOURCE

VEGETATION ✔ relevant box

☐ bare ☐ Grass ✔ Low shrub + grass ☐ Tall shrub + grass

☐ low shrub ☐ tall shrub ☐ plantation / woodland ☐ Hillfire

✔ **all relevant boxes**	**Angle**	**Aspect**	**Irregular**	**Convex**	**Concave**	**Planar**
Main scarp	48°	115°			✔	
Source floor	40°	115°		✔		
Pre-failure Slope	35°	110°			✔	

Max width	12.5 m	**Max length**	18.2 m
Max depth	1.2 m		

Notes:

- Possible sheeting joint crosses source of main landslide, may indicate an underlying structural influence.
- Deformed quartz vein observed in floor of main source, indicates possible deformation of insitu rock mass.

00CSE_Field_Rep

Detailed Study of Selected Natural Terrain Landslides at Cloudy Hill

SOURCE (Continued)

MATERIALS EXPOSED

Max. Thick.	Material Type	Material Description	% material by volume			
			>200 mm	60–200 mm	20–60 mm	<20 mm
1.2	Fine Colluvium	Firm, reddish brown sandy gravelly SILT/CLAY with occasional angular cobbles of tuff		15	25	60
0.2	Highly Decomposed Tuff	Moderately weak, light grey speckled black mottled reddish brown, highly decomposed Tuff with closely spaced joints				100
Regolith Type(s): Colluvium over C/HDT						

STRUCTURAL DETAILS

Type	Dip	Dip Direction	Persistence	Spacing	Opening / Aperture	infill	Waviness	Roughness	Significance
J	27	220	8m	-	5-30mm	Clay			Possible sheeting joint cross-cutting main landslide scar
J	47	341	1m	-					
J	42	354	5m	100mm					
J	48	356	3m	60mm					
J	40	194	0.8m	-					
J	25	198	0.5m	-					
J	39	191	1.2m	-					
J	24	155	-	-					
J	58	007	-	-					
J	67	351	-	-					

SOIL PIPES * **Total Number**

Diameter										
Open										
Infilled										

Seepage *	Yes/No	Flow Rate	

** Mark locations of pipes and seepages on Sketch Plan*

NOTES / INITIATION:

LANDSLIDE No. 00C

Detailed Study of Selected Natural Terrain Landslides at Cloudy Hill

DEBRIS TRAIL

SUBSTRATE

Max. Thickness	Material Type	Description
0.1	Top soil	Firm grey slightly sandy SILT
0.2	Highly decomposed tuff	Moderately weak light reddish brown highly decomposed tuff (stiff slightly sandy SILT)
0.3	Moderately decomposed tuff	Moderately strong, grey and light brown moderately decomposed tuff with closely spaced joints
Regolith:		

Debris Type	Description *	Clast / Matrix Supported	% by volume >200 mm	60 – 200 mm	2-60 mm	<2mm
Colluvium	Light reddish brown slightly sandy gravelly SILT/CLAY with some angular to sub-angular cobbles of tuff up to 180mm in size	matrix		15	10	75

** Include maximum clast size in Description*

Notes / Process:

LANDSLIDE No. 00C

Detailed Study of Selected Natural Terrain Landslides at Cloudy Hill

PHOTOGRAPHS

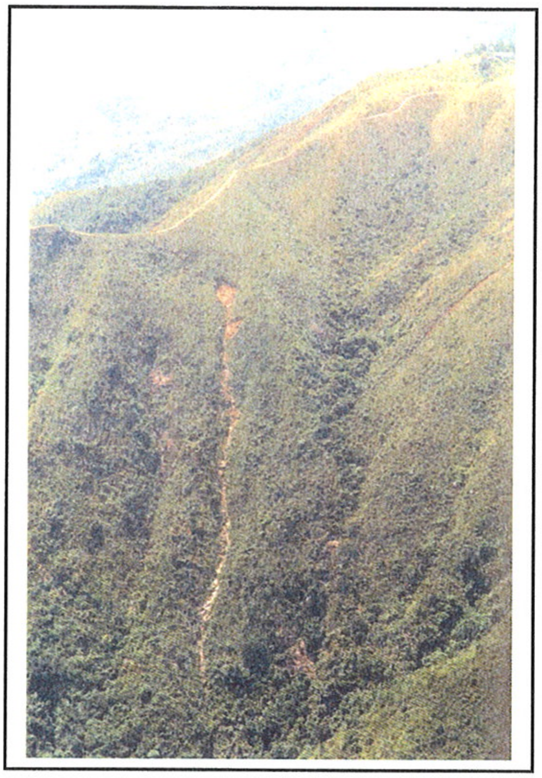


PLATE 1: View of Landslide Source and Debris Trail (Photograph Taken 9 July 2001)

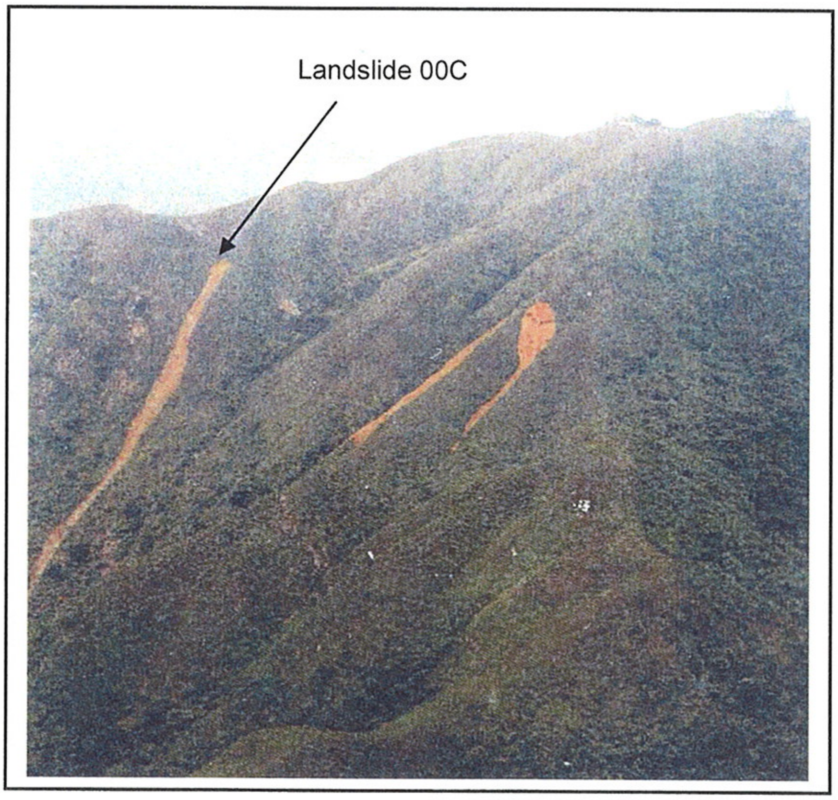


PLATE 2: View of Landslide Source and Debris Trail (Photograph Taken on 27 November 2000)

LANDSLIDE No. 00C

Detailed Study of Selected Natural Terrain Landslides at Cloudy Hill

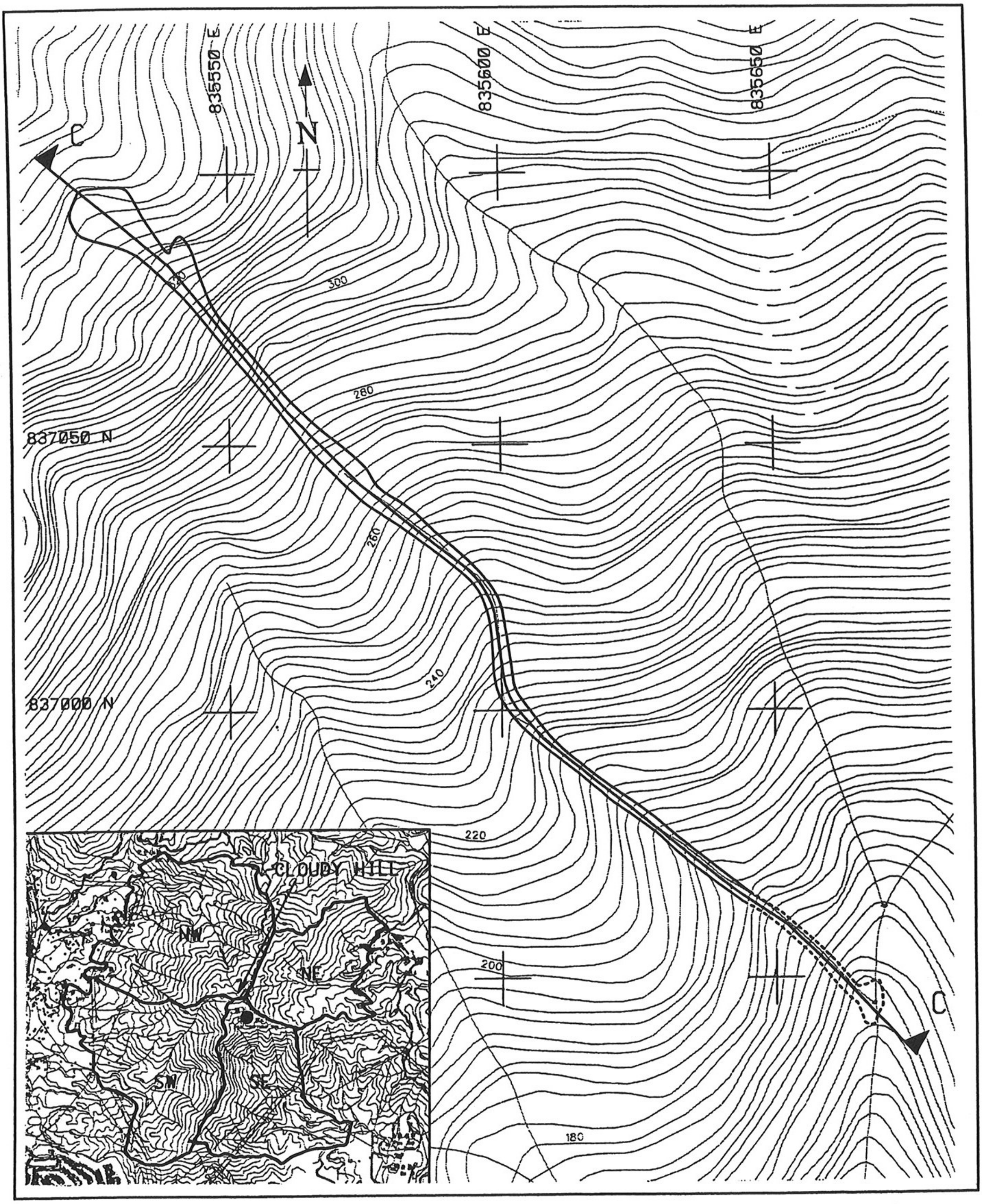


Figure 1 **Location map** **(see Figure 5 for Section C-C)** **Scale 1:1000**

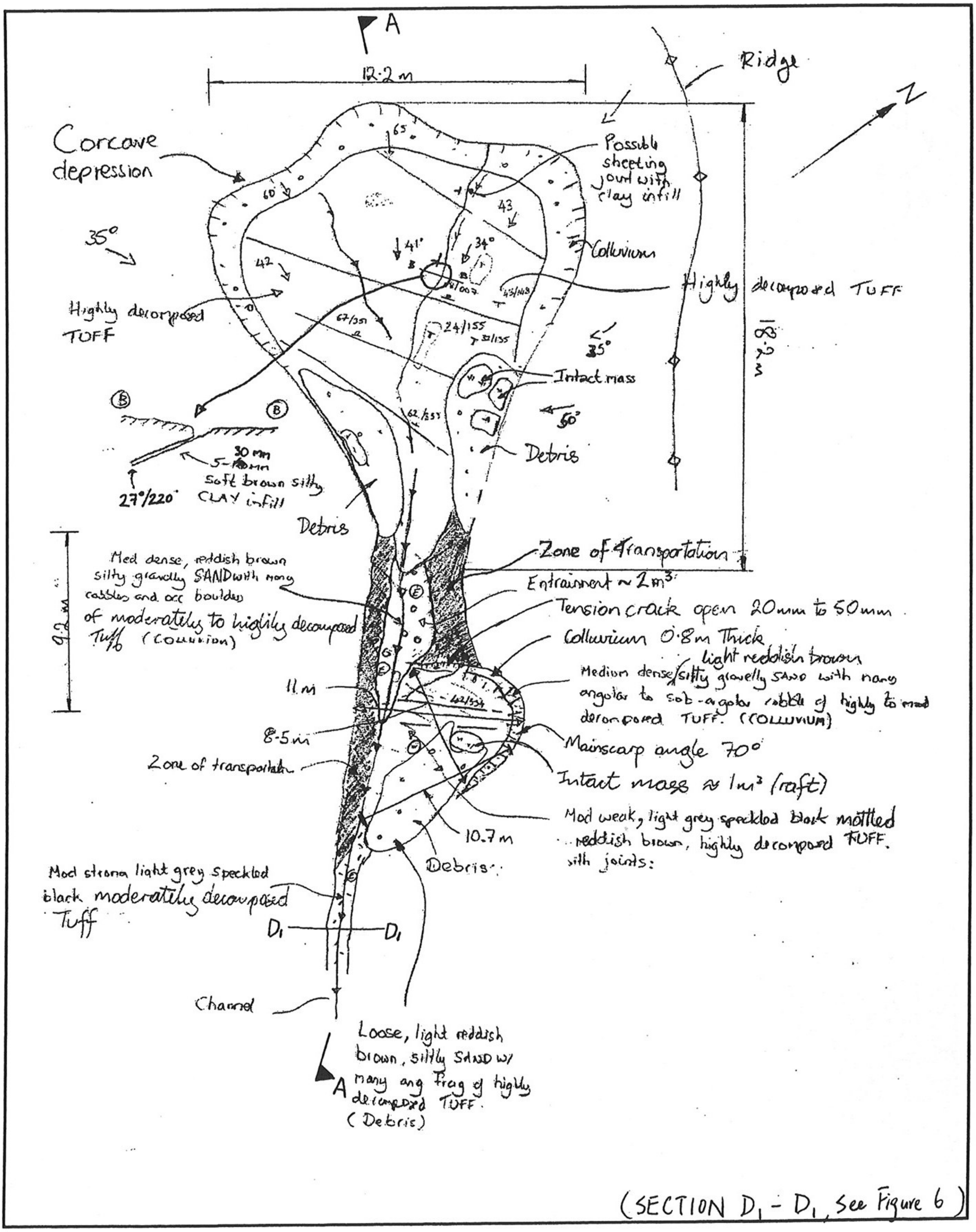


Figure 2 Sketch plan of landslide source

LANDSLIDE No. 00C

Detailed Study of Selected Natural Terrain Landslides at Cloudy Hill

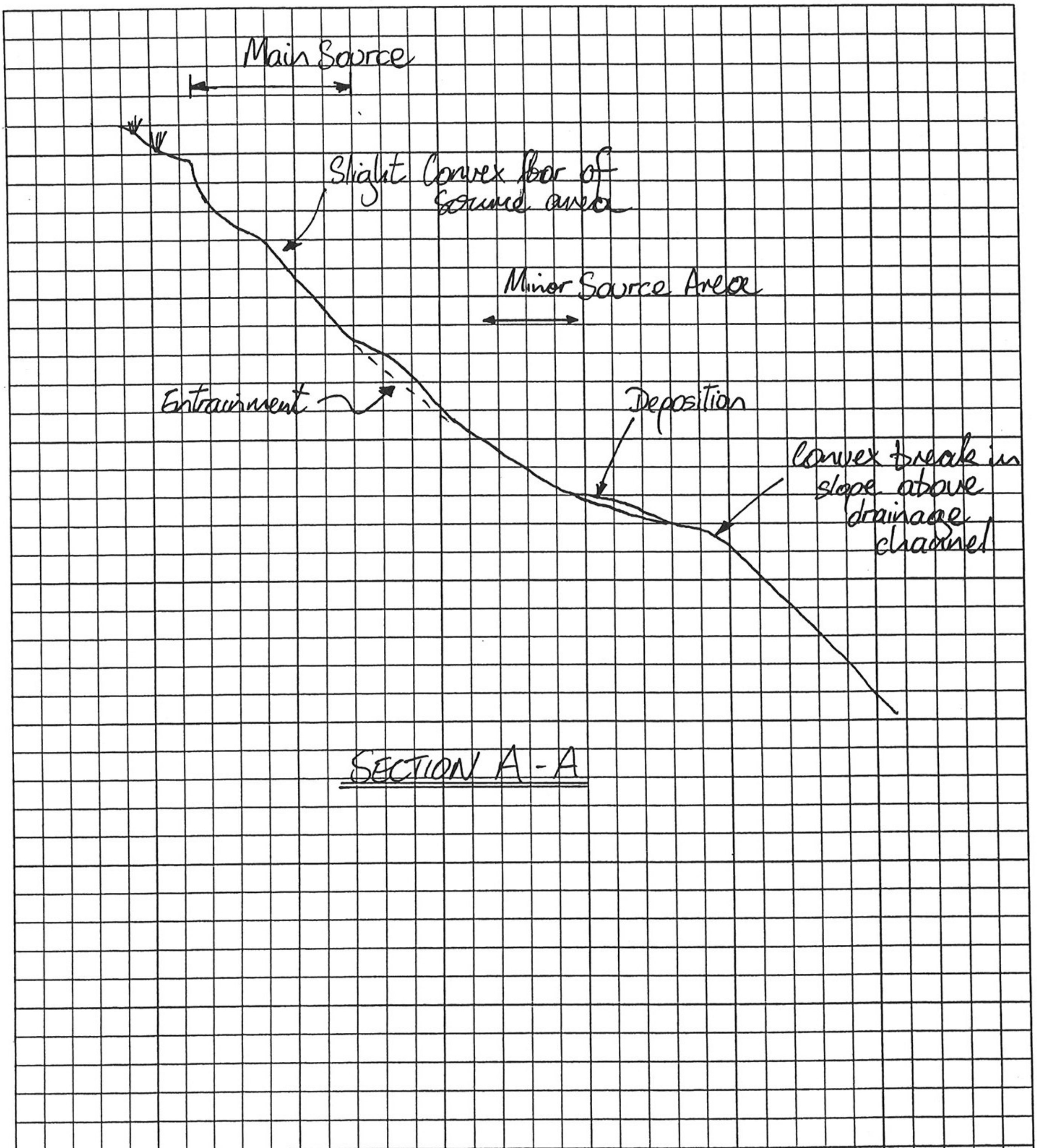


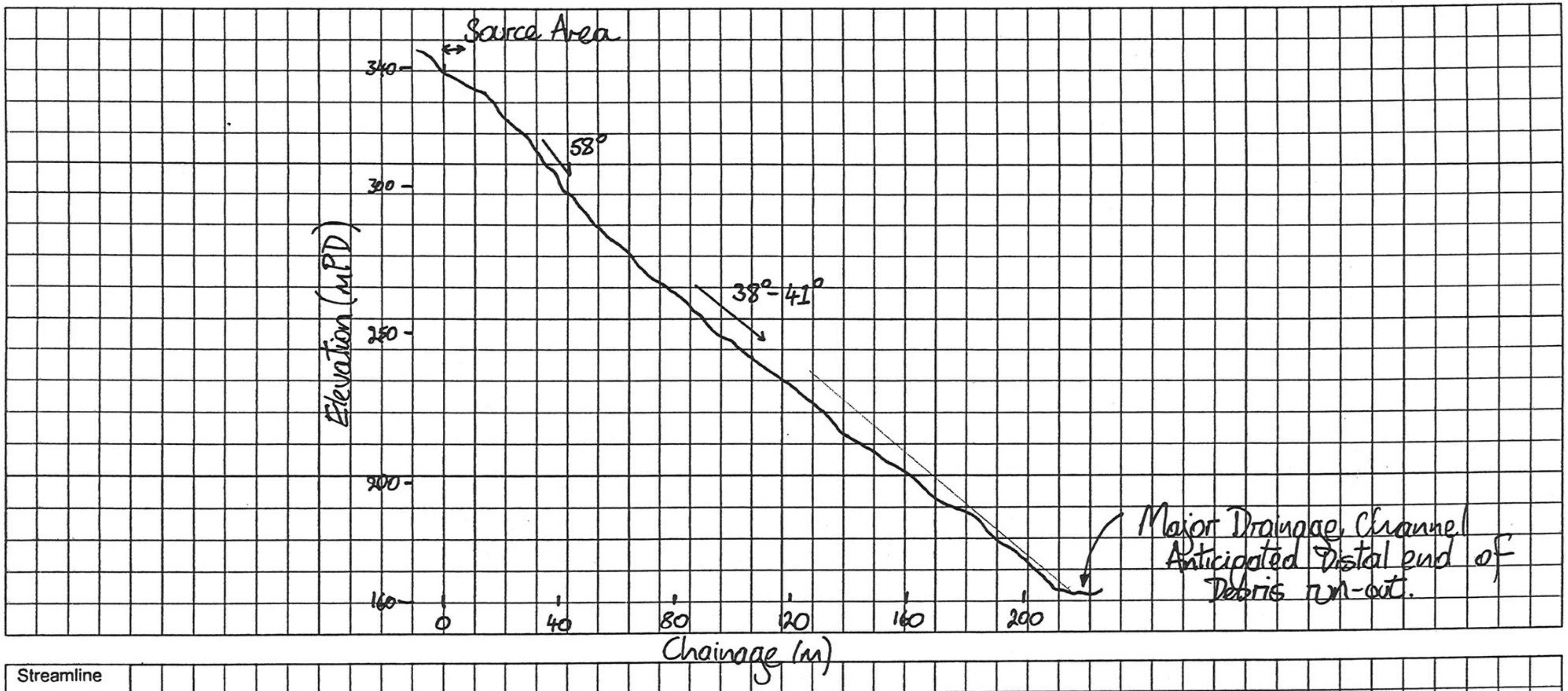
Figure 3 Annotated sections through landslide source

Debris Trail not inspected due to the steep terrain below landslide source

Figure 4 **Sketch plan of debris trail**

LANDSLIDE No. 00C

Detailed Study of Selected Natural Terrain Landslides at Cloudy Hill
Landslide Field Proforma



Streamline	
Eroded ditch	Scale 1:1
Width of trail	(Based on 1:1000 Digital Terrain Map).
Depth of trail	

Figure 5 **Longitudinal Section though Debris Trail**

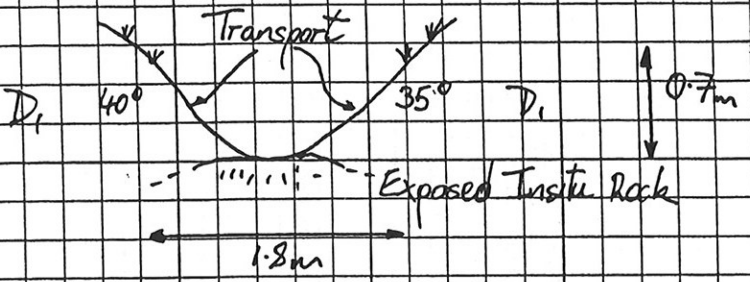


Figure 6 **Sections through debris trail**

LANDSLIDE No. 00C

Detailed Study of Selected Natural Terrain Landslides at Cloudy Hill

Debris Trail

Chainage (m)	Slope Angle	Width of Trail (m)	Depth of Trail (m)	Deposition (m^3)	Material Deposited	Material Eroded (m^3)	MT Eroded	Max. Clast Diameter (m)	% Fines	Substrate
5	42	1.8	0.7	-	-	0.2	CDT	-	60	CDT

-1- **LANDSLIDE No. 01B**

Detailed Study of Selected Natural Terrain Landslides at Cloudy Hill

LANDSLIDE SETTING

Mapped by	DMD	**Date**	30/11/01	**Weather**	Hot and fine

1:1000 map sheet No	3 – SW – 19D/24B	**Grid reference GPS**	E 835633 / N 837216
Catchment No	SE		
Landslide No	001B		
Year first observed	2001		
Evidence	Visible after rainstorm in early June 2001, and at Helicopter reconnaissance in July 2001		
Mapped geology	*Formation: Tai Mo Shan Lithology: Undivided, coarse ash crystal tuff*		

Within Catchment	**Rock exposure**	**Break in slope**	**Ridgeline**	**Stream course**
Proximity of landslide source area to:	None	Slight convex break in slope above landslide crown	5-10m SW from ridgeline	120 m – 130 m
Morphological position	Below ridgeline on flank of drainage channel			
Previous failure	None apparent from field inspection			
Anthropogenic features *(Paths, fires, drains etc)*	None. Area previously affected by hill fire in 1986			

SOURCE

VEGETATION ✔ relevant box

bare	Grass	✔ Low shrub + grass	Tall shrub + grass
low shrub	tall shrub	plantation / woodland	Hillfire

✔ all relevant boxes	**Angle**	**Aspect**	**Irregular**	**Convex**	**Concave**	**Planar**
Main scarp	60-70°	195°			✔	
Source floor	42°	185°		✔		
Pre-failure Slope	38°	221°		✔		

Max width	15.6 m	**Max length**	26.8 m
Max depth	1.8 m		

Notes:

i) Relatively small catchment less than 100 m^2

ii) Landslide appears to be controlled by localised thick deposits of Colluvium and possible minor structural influence from joints observed in highly and moderately decomposed tuff

SOURCE (Continued)

MATERIALS EXPOSED

Max. Thick.	Material Type	Material Description	% material by volume			
			>200 mm	60–200 mm	20–60 mm	<20 mm
0.4 m	Fine Colluvium	Reddish brown slightly sandy SILT/CLAY with some gravel and occasional angular cobbles of tuff	5	15	20	60
0.6	Bouldery Colluvium	Angular BOULDERS of moderately decomposed tuff with much sandy silt/clay matrix, some gravel and occasional angular cobbles	40	10	5	45
0.4	Completely Decomposed Tuff	Extremely weak light reddish brown completely decomposed tuff (firm to stiff slightly sandy SILT/CLAY with occational fine gravel of quartz)				100
0.1	Moderately Decomposed Tuff	Moderately strong, light brown moderately decomposed coarse ash crystal tuff with closely spaced joints dipping between 45° and 80°				100
Regolith Type(s): Colluvium over CDT						

STRUCTURAL DETAILS

Type	Dip	Dip Direction	Persistence	Spacing	Opening / Aperture	infill	Waviness	Roughness	Significance
J	47	224	0.5	-	-	-	Planar	Smooth	dips towards landslide toe
J	77	252	1.5	50- 60 mm	1-2 mm	none	Undulating	Rough	

SOIL PIPES * Total Number 1

Diameter	25 mm									
Open	Yes									
Infilled	None									

Seepage *	/No	Flow Rate	

** Mark locations of pipes and seepages on Sketch Plan*

NOTES / INITIATION:

Probably triggered by heavy rainfall creating a perched water table over the colluvium/decomposed tuff interface

LANDSLIDE No. 01B

Detailed Study of Selected Natural Terrain Landslides at Cloudy Hill

DEBRIS TRAIL

SUBSTRATE

Max. Thickness	Material Type	Description
0.1	Top Soil	Firm light grey SILT/CLAY
0.2	Completely Decomposed Tuff	Extremely weak light reddish brown completely decomposed tuff (sandy SILT/CLAY with occasional fine gravel of quartz)
Regolith: Top Soil		

Debris Type	Description *	Clast / Matrix Supported	% by volume >200 mm	60 – 200 mm	2-60 mm	<2mm
Colluvium	Light brown slightly sandy SILT/CLAY with much gravel and some angular cobbles and occasional boulders up to 350mm in size.	matrix	2	20	20	58

** Include maximum clast size in Description*

Notes / Process:

PHOTOGRAPHS

LANDSLIDE No. 01B

Detailed Study of Selected Natural Terrain Landslides at Cloudy Hill

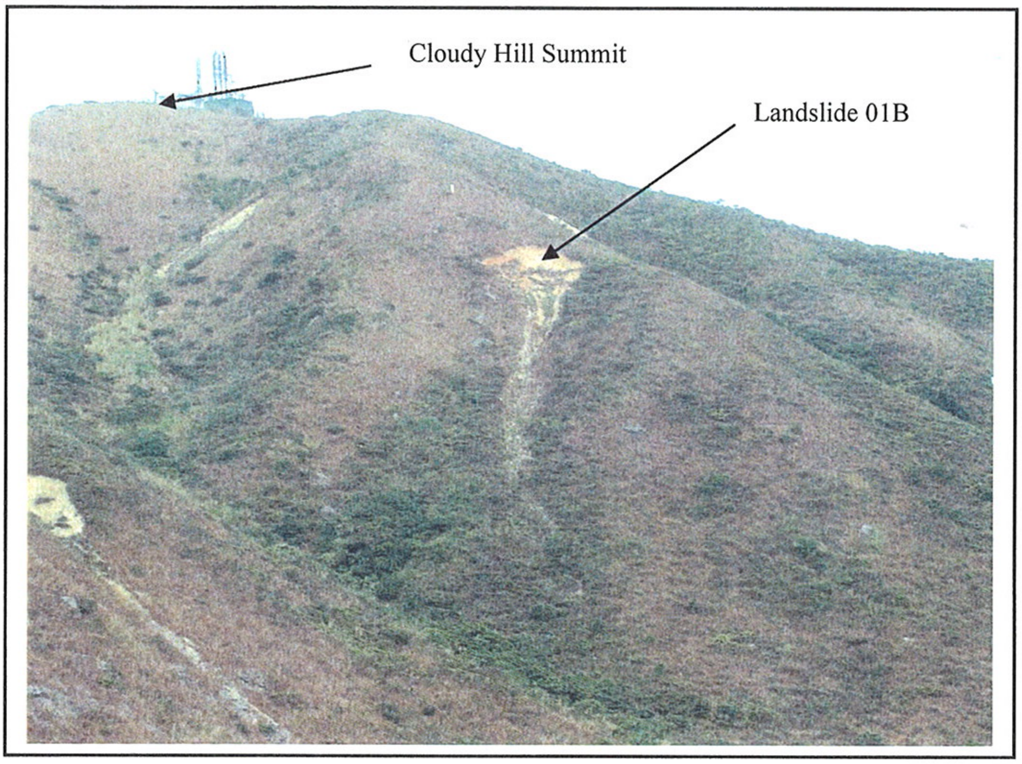


PLATE 1: View of Landslide Source and Debris Trail (Photograph Taken on 30 November 2001)

PLATE 2: View of Landslide Western Flank and Back Scarp (Photograph taken on 9 August 2001)

LANDSLIDE No. 01B

Detailed Study of Selected Natural Terrain Landslides at Cloudy Hill

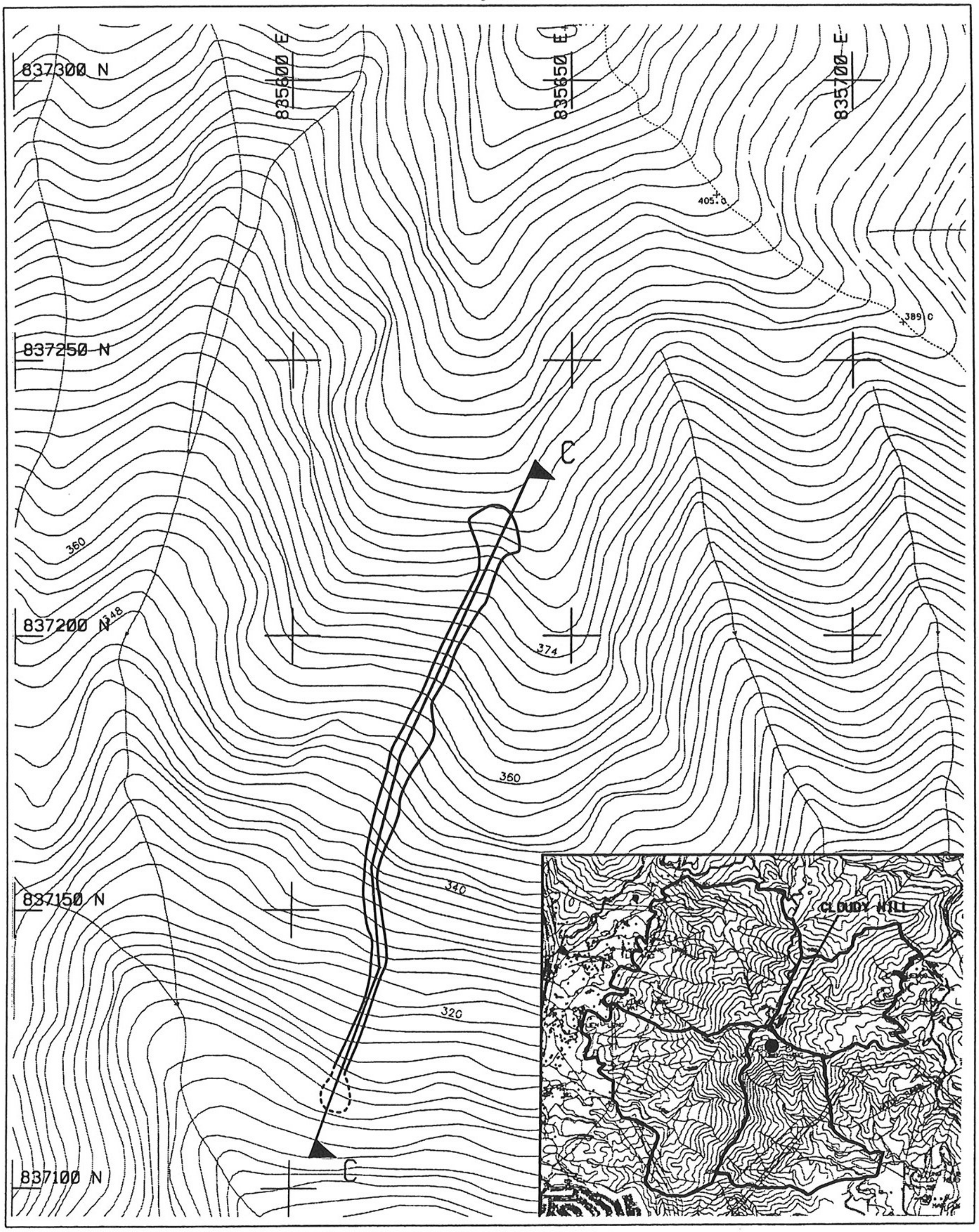


Figure 1 **Location map** **(see Figure 5 for Section C-C)** **Scale 1:1000**

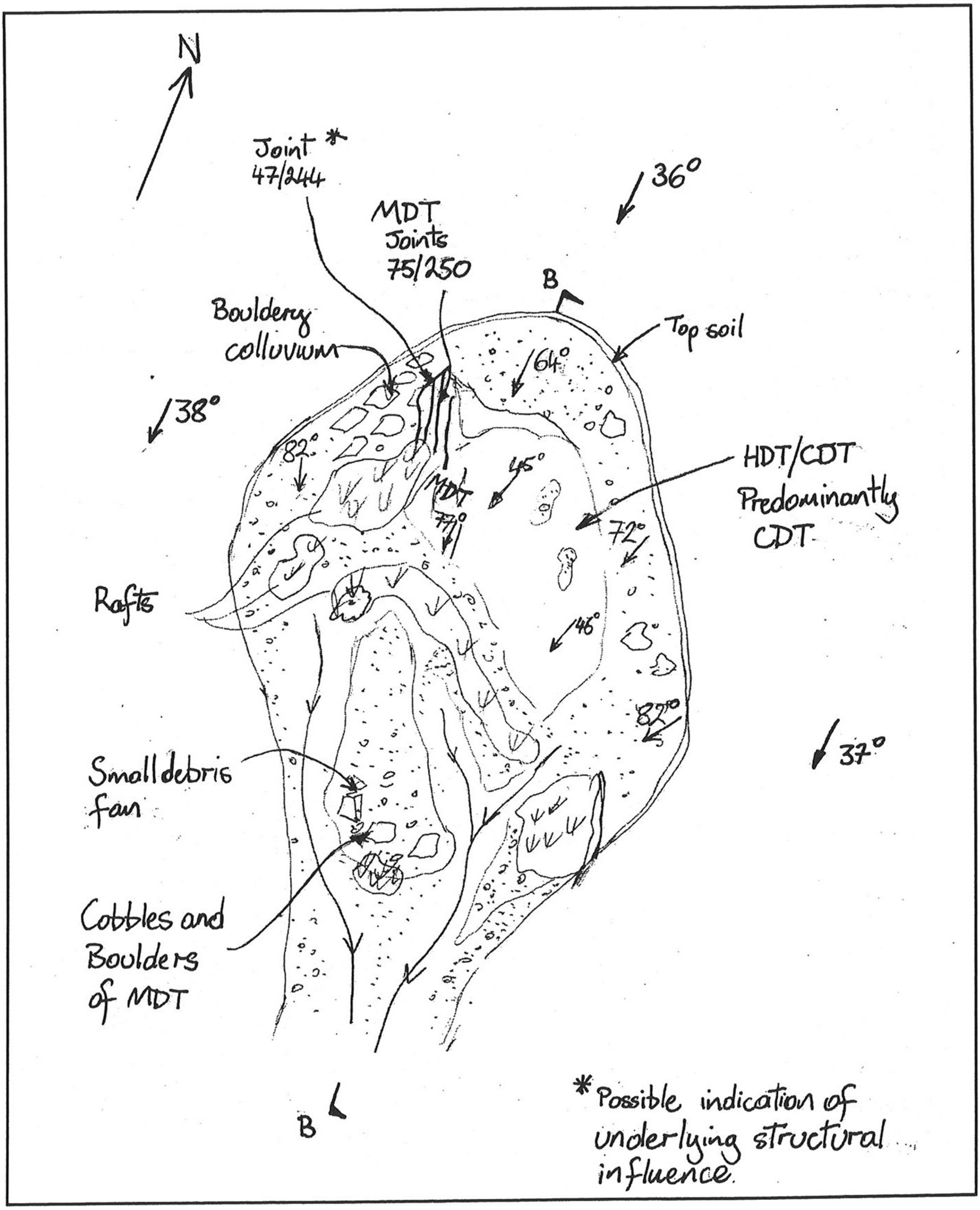


Figure 2 **Sketch plan of landslide source**

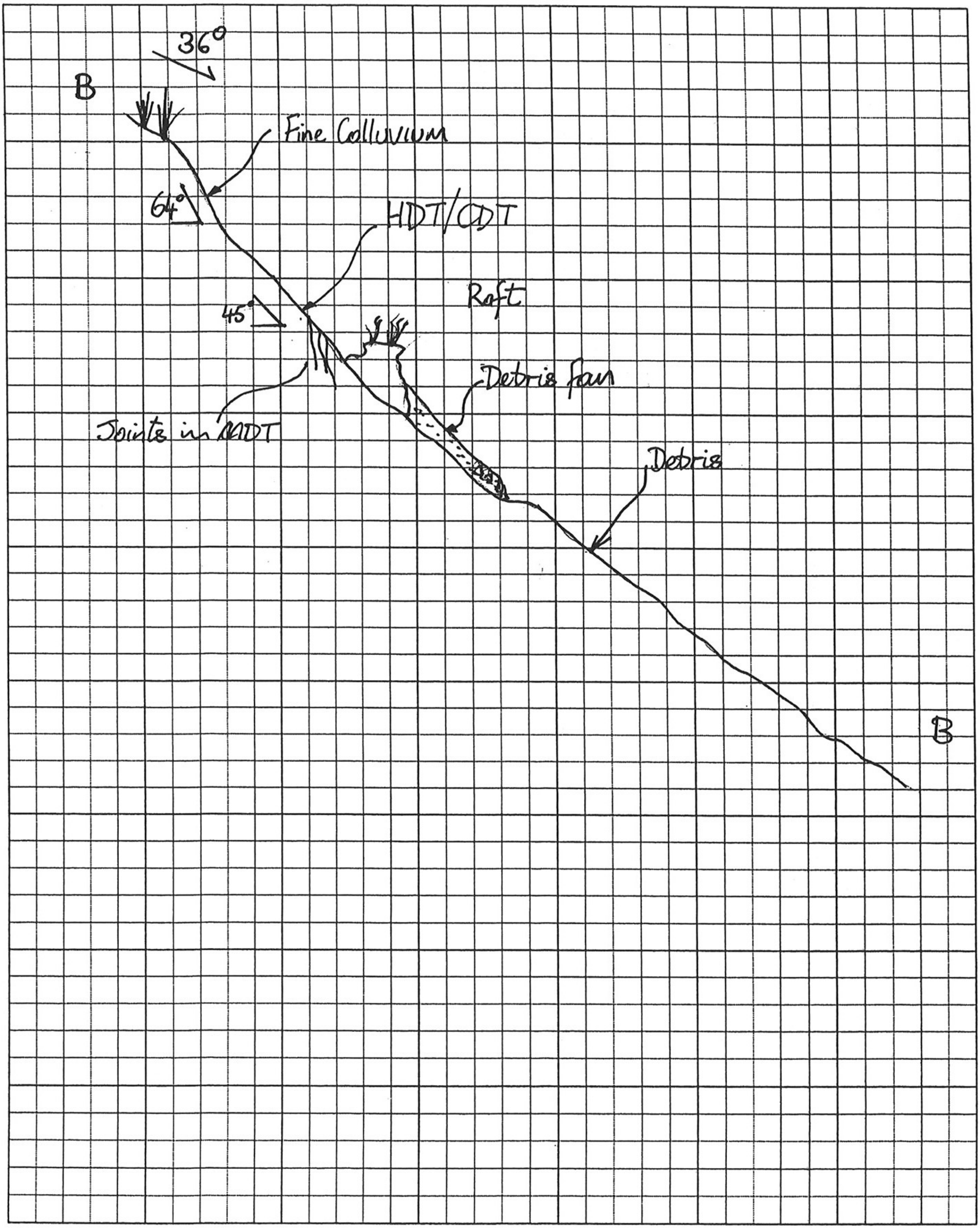


Figure 3 Annotated sections through landslide source

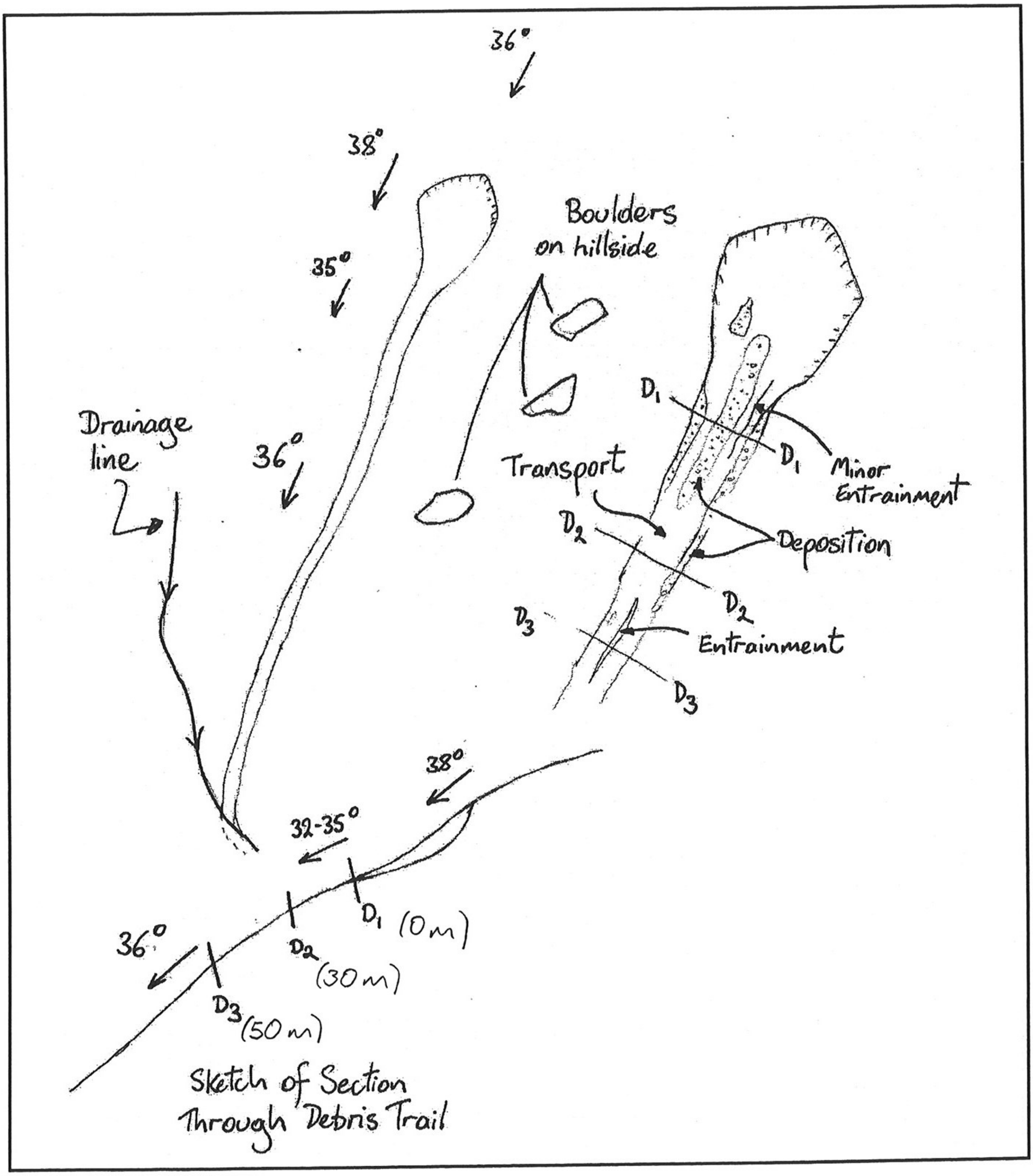
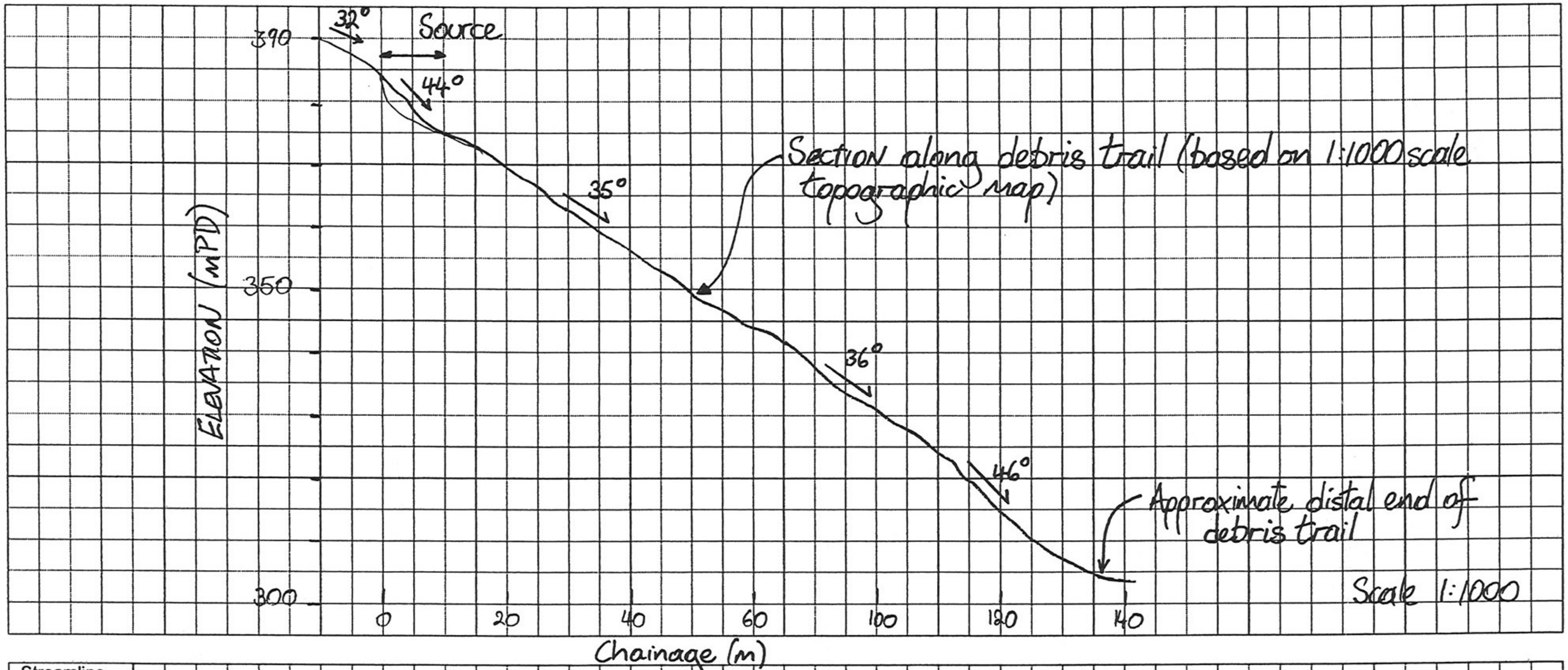


Figure 4 Sketch plan of debris trail

Detailed Study of Selected Natural Terrain Landslides at Cloudy Hill
Landslide Field Proforma



Streamline	
Eroded ditch	
Width of trail	
Depth of trail	

Figure 5 **Longitudinal Section though Debris Trail**

01BSE_Field_rep

LANDSLIDE No. 01B

Detailed Study of Selected Natural Terrain Landslides at Cloudy Hill
Landslide Field Proforma

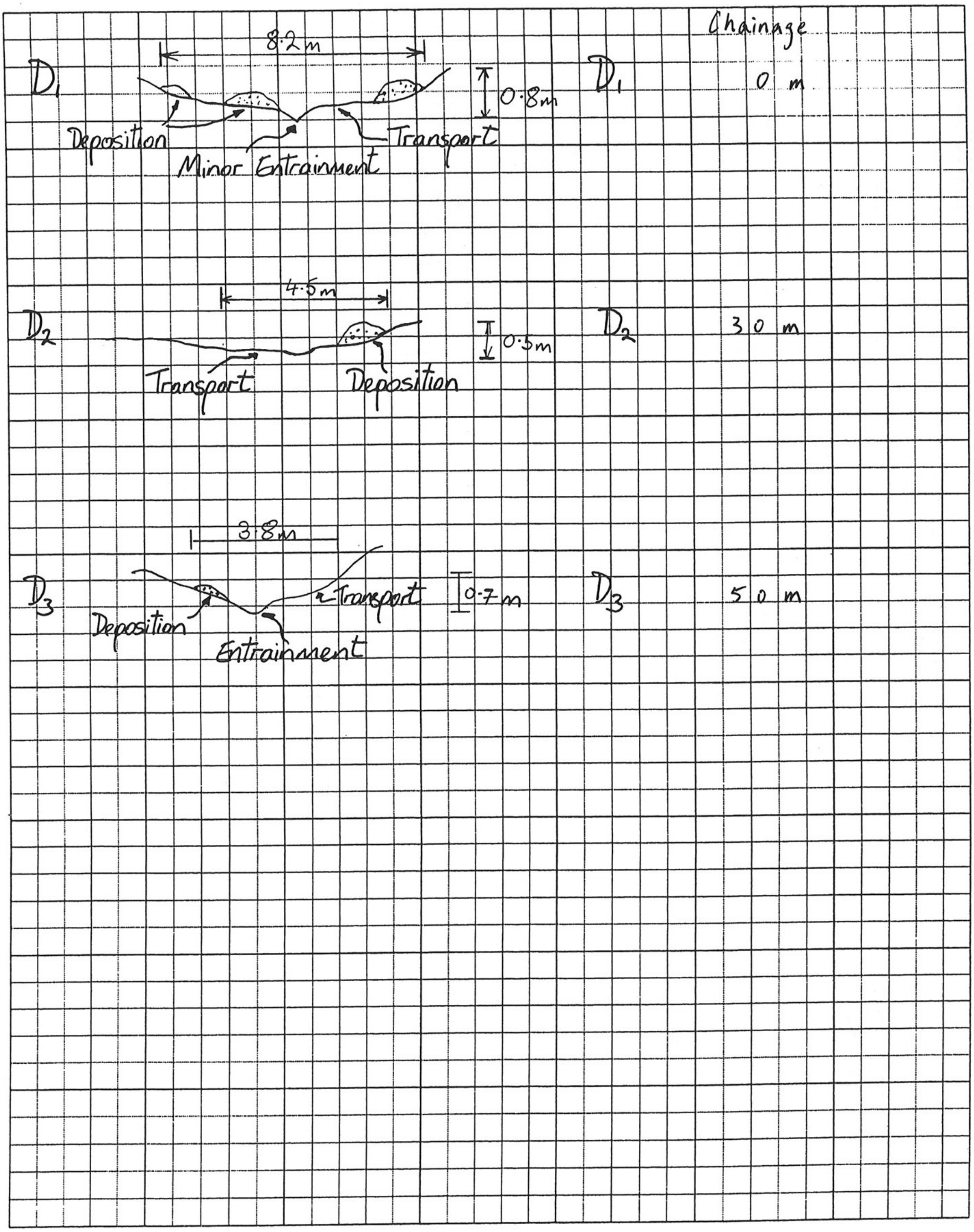


Figure 5 **Sections through debris trail**

LANDSLIDE No. 01B

Detailed Study of Selected Natural Terrain Landslides at Cloudy Hill

Debris Trail

Chainage (m)	Slope Angle	Width of Trail (m)	Depth of Trail (m)	Deposition (m^3)	Material Deposited	Material Eroded (m^3)	MT Eroded	Max. Clast Diameter (m)	% Fines	Substrate
0	36	8.2	0.8	2.5	colluvium	CDT		>300 mm	40	Top Soil/CDT
30	34	4.5	0.5	1	colluvium	-		240 mm	60	Top Soil/CDT
50	36	3.8	0.8	0.25	colluvium	CDT		150 mm	60	Top Soil/CDT

LANDSLIDE No. 01H1 & H2

Detailed Study of Selected Natural Terrain Landslides at Cloudy Hill

LANDSLIDE SETTING

Mapped by	DMD/HHSU	**Date**	29/11/2001	**Weather**	Complete Cloud Cover

1:1000 map sheet No	3-SW-19C,19D	**Grid reference GPS**	E835353	N837373
		H2	E835358	N837350
Catchment No	SW			
Landslide No	01H1SW			
Year first observed	2001			
Evidence	Visible after rainstorm in early June 2001, and at Helicopter reconnaissance in July 2001			
Mapped geology	*Formation: Tai Mo Shan*	*Lithology: Undivided, coarse ash crystal tuff*		

Within Catchment	**Rock exposure**	**Break in slope**	**Ridgeline**	**Stream course**
Proximity of landslide source area to:	None	Slight convex break in slope at landslide location	5-8m	100m
Morphological position	Flank of drainage channel below ridgeline			
Previous failure	Possible previous failure below toe of landslide			
Anthropogenic features *(Paths, fires, drains etc)*	Footpath 5-6m north-east of landslide crown			

SOURCE

VEGETATION ✔ relevant box

bare	Grass	✔Low shrub + grass	Tall shrub + grass
low shrub	tall shrub	plantation / woodland	Hillfire

✔ all relevant boxes	**Angle**	**Aspect**	**Irregular**	**Convex**	**Concave**	**Planar**
Main scarp	60°	230°	✔			
Source floor	47°	230°	✔			
Pre-failure Slope	38°	210°		✔		

Max width	6.4 m	**Max length**	19.6 m
Max depth	1.2 m		

Notes:
- Debris Channelised
- Rock exposed near landslide crown
- 3 weathered and deformed quartz veins

LANDSLIDE No. 01H1 & H2

Detailed Study of Selected Natural Terrain Landslides at Cloudy Hill

SOURCE (Continued)

MATERIALS EXPOSED

Max. Thick.	Material Type	Material Description	% material by volume >200 mm	60–200 mm	20–60 mm	<20 mm
1.0	Fine colluvium	Firm to stiff reddish brown sandy CLAY/SILT with some gravel and some angular cobbles of tuff	2	10	20	68
0.2	Bouldery colluvium	Angular BOULDERS with much sandy CLAY/SILT occasional angular cobbles	40	20	10	30
0.2	CDT & MDT					
Regolith Type(s): Fine colluvium over CDT						

STRUCTURAL DETAILS

Type	Dip	Dip Direction	Persistence	Spacing	Opening / Aperture	infill	Waviness	Roughness	Significance
J	62	268	1.5	-	-	Qtz			Joint in exposed rock near landslide crown
J	88	232	2.1	-	-	-			Forms a step in floor of landslide
V	64	270	1.8	-	-	Qtz 55mm thick			Possible structural influence to landslide the upper surface of the vein forms part of the landslide source floor

SOIL PIPES * **Total Number** None Apparent

Diameter										
Open										
Infilled										

Seepage *	Yes/No	**Flow Rate**	

** Mark locations of pipes and seepages on Sketch Plan*

NOTES / INITIATION: Orientation of quartz veins indicate a possible structural influence to the landslide

LANDSLIDE No. 01H1 & H2

Detailed Study of Selected Natural Terrain Landslides at Cloudy Hill

DEBRIS TRAIL

SUBSTRATE

Max. Thickness	Material Type	Description
0.3	Completely Decomposed Tuff	Extremely weak light pinkish red completely decomposed tuff (silty/clay SAND with occasional fine gravel of quartz)
Regolith: CDT		

			% by volume			
Debris Type	Description *	Clast / Matrix Supported	>200 mm	60 – 200 mm	2-60 mm	<2mm
Colluvium	Loose, light reddish brown (dry) slightly sandy SILT/CLAY with much angular gravel and some angular cobbles and boulders of tuff					

** Include maximum clast size in Description*

Notes /
Process: Terrain below landslides becomes very steep (about 50°). The debris trail was therefore not fully inspected.

PHOTOGRAPHS

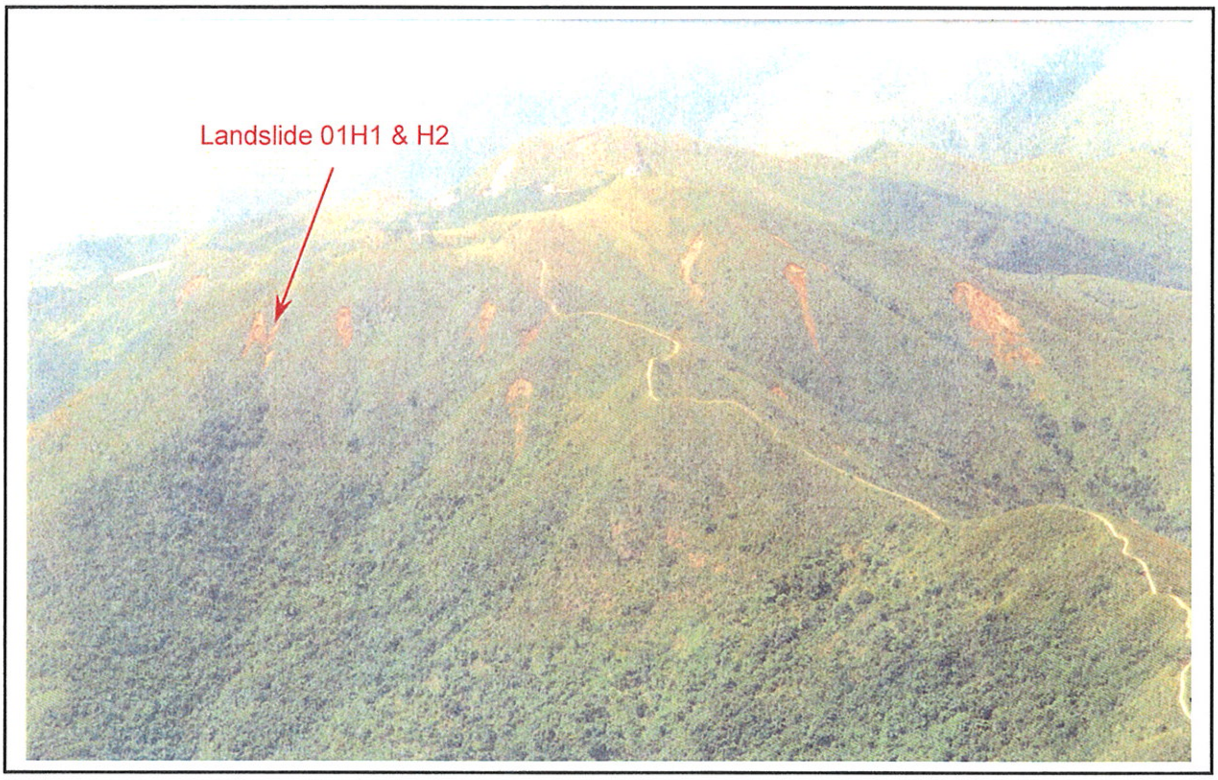


PLATE 1: View of Cloudy Hill Landslides (Photograph Taken 9 July 2001)

PLATE 2: View of H1 Landslide Source (Photograph Taken 9 August 2001)

LANDSLIDE No. 01H1 & H2

Detailed Study of Selected Natural Terrain Landslides at Cloudy Hill

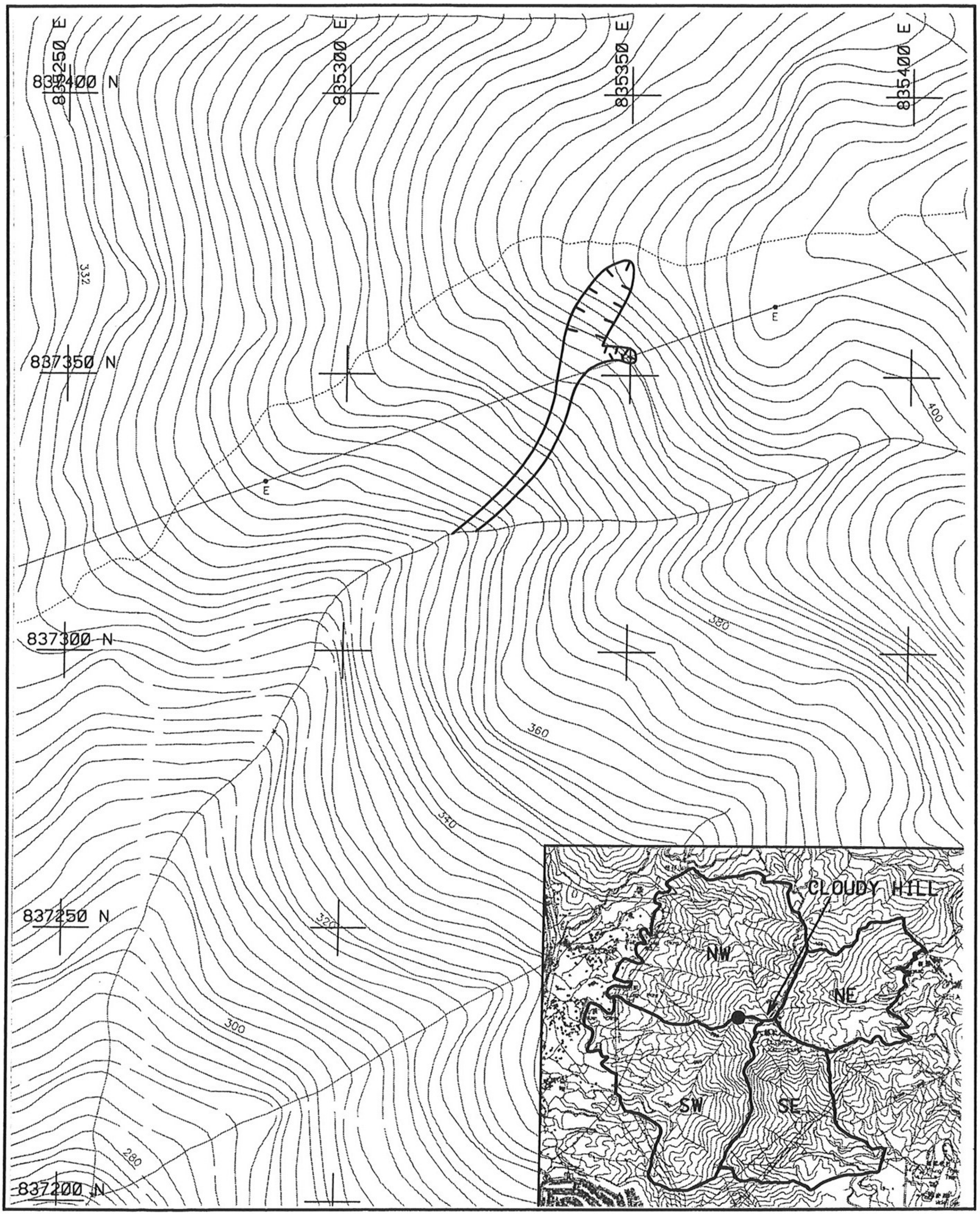


Figure 1 Location map (see Figure 5 for Section C-C) Scale 1:1000

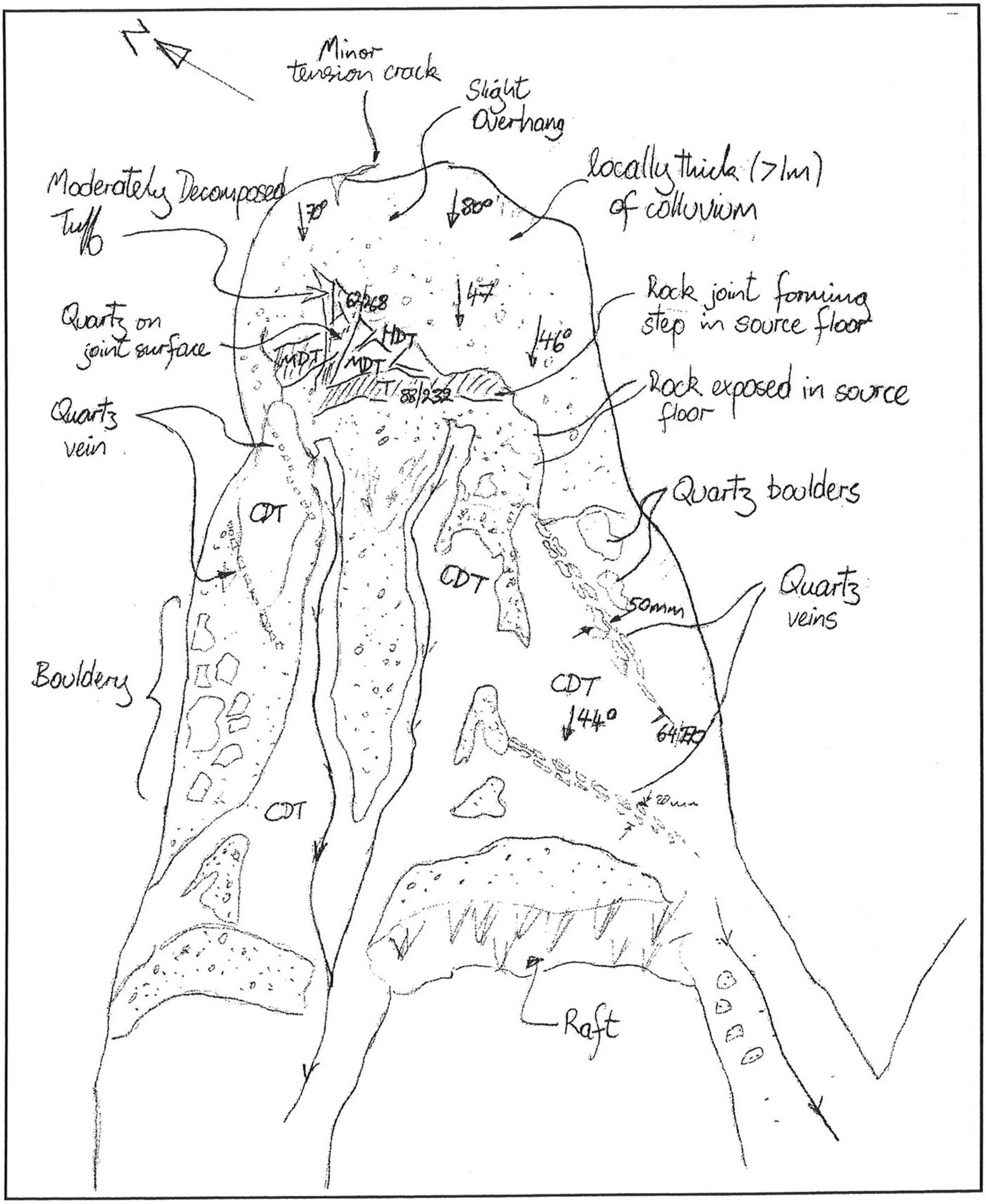
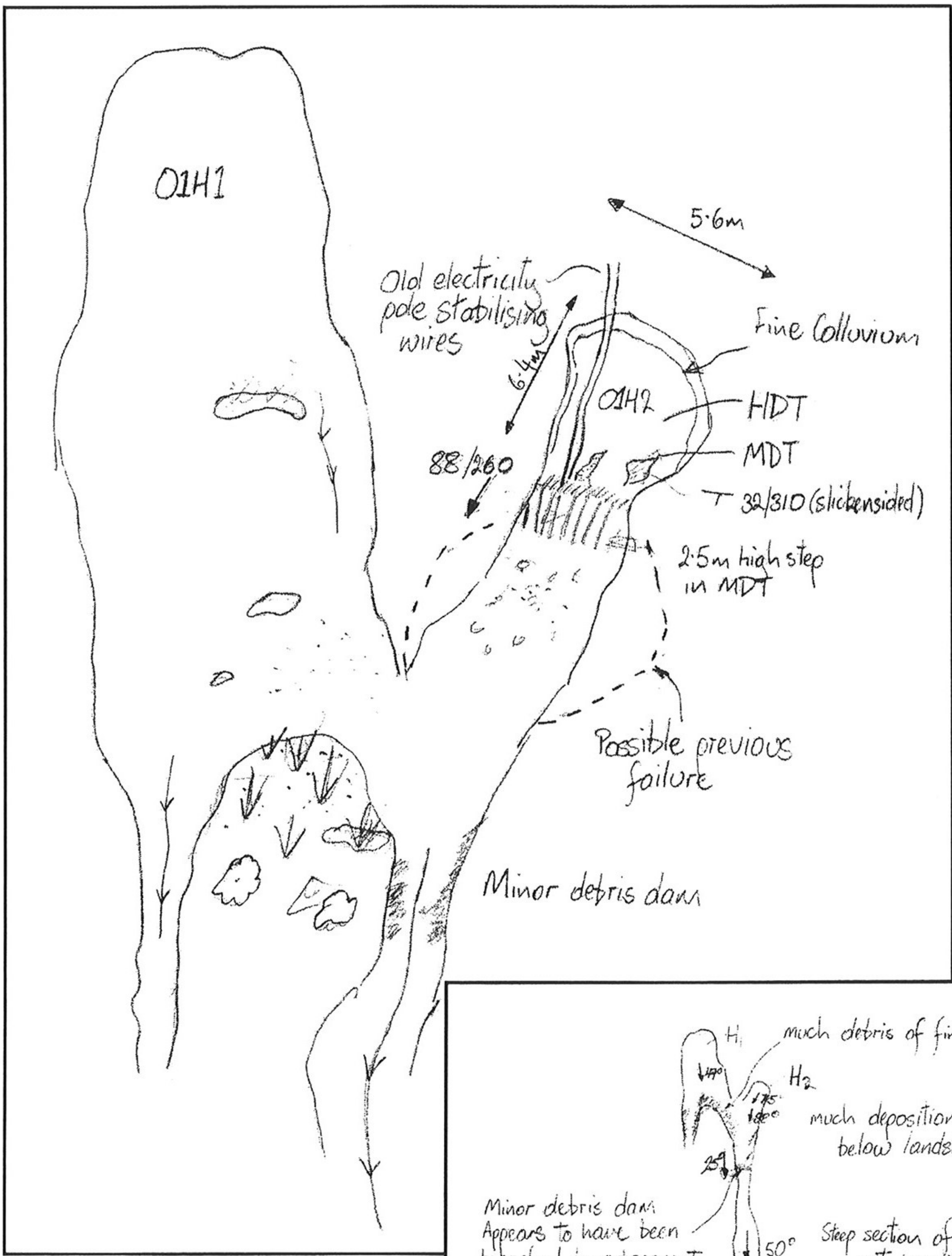


Figure 2-1 Sketch plan of landslide source

Detailed Study of Selected Natural Terrain Landslides at Cloudy Hill



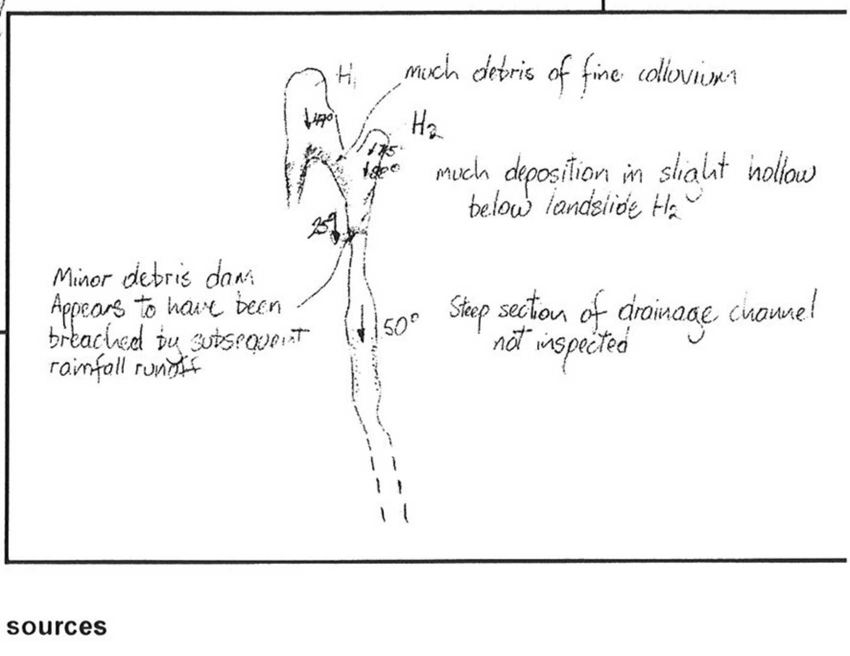


Figure 2-2 Sketch plan of landslide sources

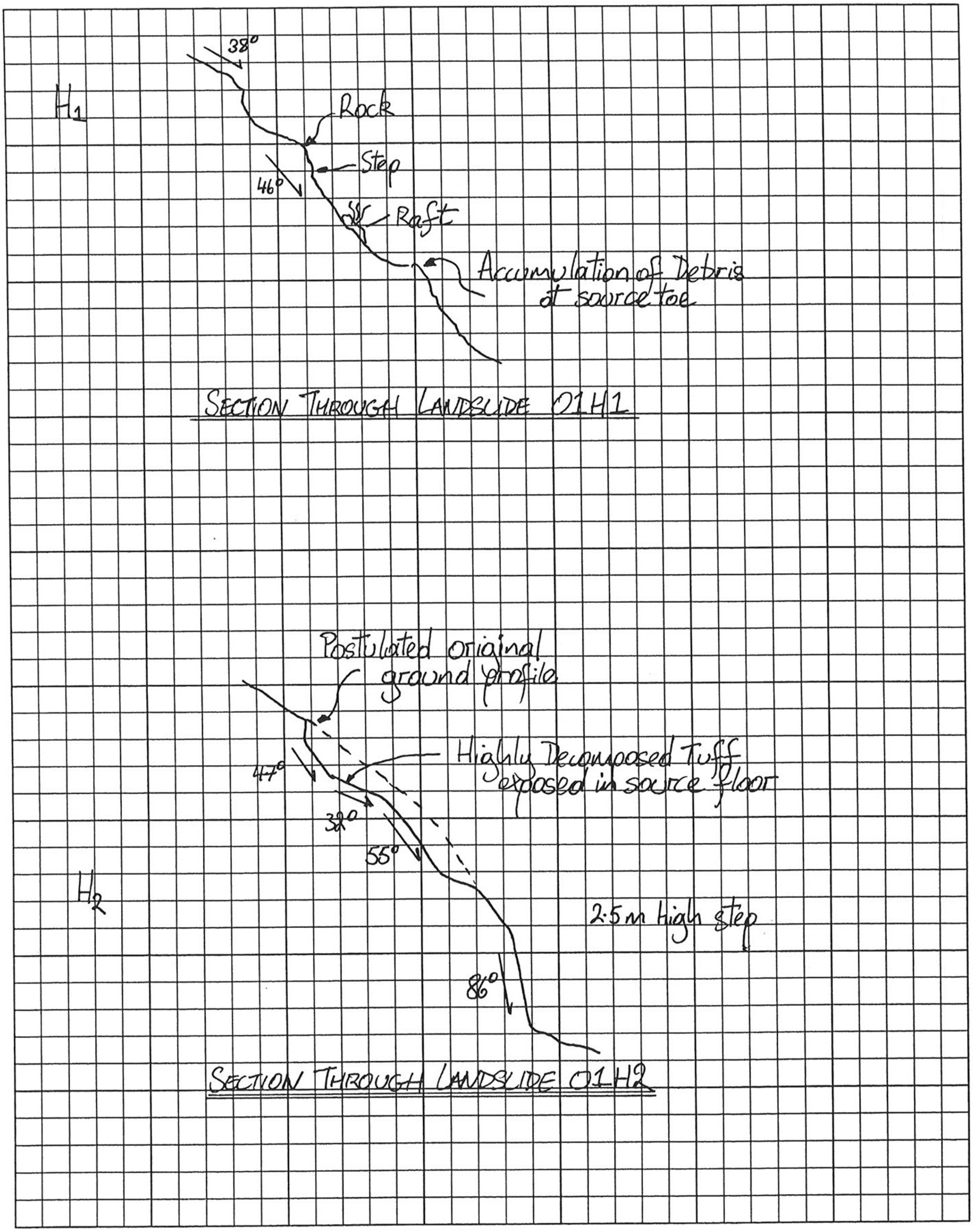


Figure 3 Annotated sections through landslide source