

Tauranga District Council  
Private bag 12022  
Tauranga

8 January 2010

For the attention of [REDACTED] s 7(2)(f)(ii)

Dear [REDACTED] s 7(2)(f)(ii)

### **Mauao Slopes; Monitoring Report for December 2009**

Please find set out below a brief report following our recent slope and rockfall monitoring.

Items completed included:

1. Discuss developments with Ranger.
2. Walkover reviewing slopes from all tracks. Spring flows, slip movements, rockfall evidence, vegetation development etc recorded and photographed.
3. Laser EDM survey carried out at 6 benchmark group locations on; West, North, East Bluffs and Zone 6.
4. Sets of photos from locations A to M around summit for scour monitoring.
5. Visit all 2005 slip sites and check for re-vegetation, stability and tension crack development.
6. Check of the area in which the boulder was scaled with explosives in June 2007.

A summary of findings regarding these items would be:

1. No rockfall or slip events have been reported to or observed by Ranger staff since the previous monitoring (June 2009).
2. This walkover found no evidence of recent rockfall. Springs were showing low flow rates.
3. The survey found no significant movement of the rock bluff benchmarks. Ongoing settlement of the Zone 6 scaled boulder is expected as it embeds into the soil and presents no hazard.
4. Scour is locally ongoing as anticipated on steep colluvial ground where there is little vegetation cover and exposed sand. That said, the vegetation has been very well managed over the last few years and cover continues to improve.
5. The May 2005 flood event slips now appear to have locked up and are re-vegetating well.
6. The area blasted in June 2007 was re-checked and its appearance has now weathered back to match the adjacent slopes.

Vegetation continues to re-establish well under TDC's management plan. In general appearance Mauao's slopes and tracks are in excellent condition.

It is now difficult to spot the 2003 fire damage.

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We recommend that weed spraying should continue to be well targeted to avoid development of loose sandy areas, which would be prone to scour.

Scour of sand from non-vegetated steep areas will have been the source of minor rockfall over the last six months but it is reassuring that no incidents have been reported and no signs of significant rockfall could be found on the walkover.

As stated previously; the rockfall hazard to track walkers probably continues to be highest in the northern areas if rock climbers exiting from the top of routes will walk over unstable slopes. Rock disturbed here can freefall onto the Oruahine with no warning. We understand that TDC now has good communication with rock climbing groups and individuals and most are aware that descent should be by 'lowering off', rather than 'walking off'.

Last June, catch fence options above the proposed campground chalet development were discussed with § 7(2)(f)(iii) of TDC. An engineered rockfall catch fence would be an option worthy of further consideration and Avalon can provide further recommendations & prices of requested.

#### **Photographs & notes:**



June 2009

December 2009

Photograph 1 & 2; The typical small ledge we monitor on the camp bluff.

The photographs above show how ongoing weathering continues to move around sand, gravel and small rocks on bluff ledges and how occasionally these will fall towards the tracks below.

The photographs below show typical ongoing scour of steep areas of colluvium at the crests of the bluffs.

Such areas will undoubtedly be releasing occasional small rockfall. The risk to track users is mitigated by the fact that such rockfall will most often occur during stormy weather, when the tracks are not very frequented.

The growth of vegetation below the bluffs is favourable as it will tend to catch and trap some of the smaller rockfall before it reaches the tracks.



Photograph 3; Scoured area at crest of bluffs.



Photograph 4; Scoured area at crest of bluffs.



Photograph 5; Vegetation is re-establishing well on the upper slopes.

The bluffs on Mauao will continue to release rockfall and occasionally falls will be of significant size and potentially life threatening. Predicting where & when rockfall will occur is impossible, except of course to say that more rockfall can be expected from the areas with more (and steeper) bluffs and falls will be more frequent during storms and earthquakes.

This monitoring programme continues to refine our understanding of Mauao's rockfall and slips.

When any rockfall evidence or report arises it should be reported to Avalon and will be investigated further and added to the next monitoring report.

Our next programmed monitoring will be due in the winter and I will contact you beforehand.

If you have any queries or there are any developments in the meantime please don't hesitate to contact me at any time.

Regards

s 7(2)(a) f Privacy

Attached: Site records for Dec 2009 Slope Monitoring.



Area 1a; "Camp Bluff"

1a The Camp Bluff



Distance measurement mm

	Nov-03	Jan-04	Nov-04	Mar-05	Dec-05	Mar-06	Nov-06	Jul-07	Nov-07	Nov-08	Jun-09	Dec-09
3 → 4		5211	5209	5208	<i>t possible</i>	5207	5208	5215	5210	5207	5208	5212
3 → 5		4320	4320	4321	<i>due to</i>	4320	4323	4323	4319	4322	4322	4324
3 → 6		5179	5180	5178	<i>public</i>	5180	5181	5178	5178	5178	5180	5282
4 → 5		2258	2260	2260	<i>below</i>	2260	2260	2258	2259	2261	2260	2262

Area 2a; "Blasted Column"

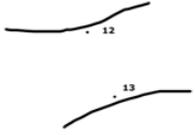
2a Columns



	Nov-03	Jan-04	Nov-04	Mar-05	Dec-05	Mar-06	Nov-06	Jul-07	Nov-07	Nov-08	Jun-09	Dec-09
8 → 11		7917	7910	7907	<i>not</i>	7906	7915	7905	7906	7905	7910	7913
8 → 9			9968	9969	<i>possible</i>	9970	9968	9968	9964	9973	9971	9971
10 → 8			3111	3111	<i>due to</i>	3112	3126	3126	3126	3114	3114	3113
10 → 9			11636	11636	<i>public</i>	11633	11635	11634	11634		11630	11636
10 → 11			8325	8325	<i>below</i>	8325	8325	8325	8320	8327	8325	8326

**Area 2i; "Elephants Joint"**

2i Elephant joint



12 → 13

Mar-03 2885	Nov-03	Jan-04 2884	Nov-04 2882	Mar-05 2887	Dec-05 2887	Mar-06 2887	Nov-06 2887	Jul-07 2885	Nov-07 2885	Nov-08 2887	Jun-09 2889	Dec-09 2883
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**Area 3a; "North East Bluff"**

3a Bluff top

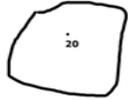


		Mar-03	Nov-03	Nov-04	1/03/2005	Dec-05	Mar-06	Nov-06	Jul-07	Nov-07	Nov-08	Jun-09	Dec-09
14	→	8110		8122	8124	8129	8129	8135	8130	8132	8128	#	8132
15	→	5050		5050	5049	5050	5050	5056	5056	5054	5058	5063	5066
16	→	4868		4874	4877	4879	4879	4868	4869	4880	4880	4882	4879
15	→	3575		3581	3571	3577	3577	3575	3575	3573	3581	3583	3579
15	→	7560		7478	7488	7485	7485	7484	7486	7486	7488	#	7486

**Blocks above Area 3d**

North Promentary

Above 3d



	Mar-03	Nov-03	Nov-04	1/03/2005	Dec-05	Mar-06	Nov-06	Jul-07	Nov-07	Nov-08	Jun-09	Dec-09
18 → 19	5248		5265	5256	5256	5254	#	5253	5253	5255	5256	5255
20 → 19	3380		3385	3373	3376	3376	3377	3375	3374	3376	3379	3378
20 → 18	8038		8065	8050	8056	8050	8053	8053	8054	8057	8056	8062

**Zone 6 Boulder 6b**

23 (LH outcrop) 22 (RH Outcrop)

21 (boulder)

	Dec-05	Mar-06	Nov-06	Jul-07	Nov-07	Nov-08	Jun-09	Dec-09
21 → 23	7560	7590	7615	7663	7639	#	7655	7659
21 → 22	5799	5830	5865	5999	5891	#	#	5911