

Tauranga District Council
Private bag 12022
Tauranga

25 June 2009

For the attention of [REDACTED]

Dear [REDACTED]

Mauao Slopes; Monitoring Report; 17 June 2009

Thanks for your help last week (17 June) with the ongoing slope inspection/rockfall monitoring program.

Items completed included:

1. Discuss developments with [REDACTED]
2. Full 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.
7. Site meeting and consultancy advice to [REDACTED].

A summary of findings regarding these items would be:

1. No rockfall or slip events have been reported to or observed by [REDACTED] since the last monitoring (December 2008).
 2. This walkover found no evidence of recent rockfall. Springs were showing relatively high flow rates.
 3. No significant movement was found on rock bluff benchmarks. Ongoing settlement of the Zone 6 scaled boulder presents no hazard.
 4. Scour is locally continuing on steep ground with no vegetation cover, however, the vegetation cover is now the best we have seen since 2003.
 5. The May 2005 flood event slips now appear to have locked up and are re-vegetating.
 6. The area blasted in June 2007 was re-checked and is now acceptably stable.
 7. The potential rockfall risk to the proposed chalet development has been reported separately. An engineered rockfall catch fence appears likely to be an option worth pursuing further given the risk and budgets involved. A fence could be concealed in the bush above the proposed development, negating public objections.
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Vegetation continues to re-establish well under TDC's management plan. In general appearance Mauao's slopes are in excellent condition. The results of the planting and weed/pest control over the last few years are really starting to show.

As previously stated, we recommend that weed spraying should continue to be well targeted to not leave extensive loose sandy areas, which would be prone to scour.

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

As 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'.

The catch fence options above the proposed campground chalet development will be discussed with s 7(2)(f)(iii)

Photographs:

Each monitoring report includes small selection of photographs to illustrate the ongoing processes and any new developments (a full photographic record is stored in our files).



December 2008



June 2009

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

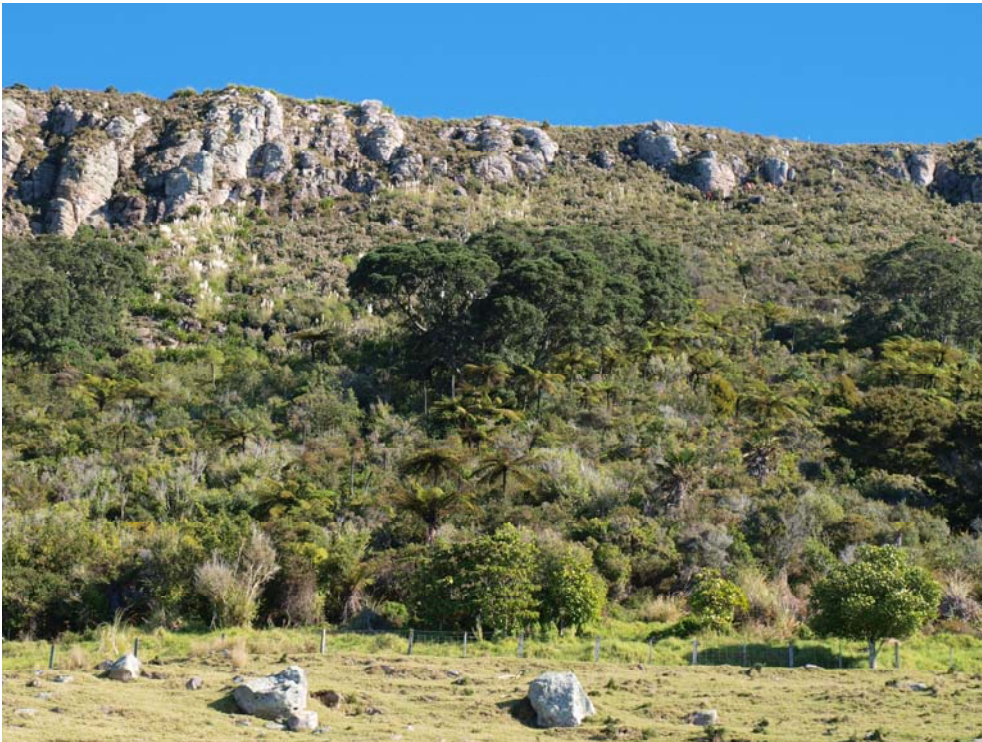
Small rocks and soil piles continue to move around. This is the natural weathering process but illustrates that rockfall must be frequent.



Photograph 2; Northern slopes; vegetation is becoming well established.



Photograph 3; Slip scar on lower slopes above eastern campground; vegetation is now becoming well established.



Photograph 4; Slopes to the north of the camp bluff now show little evidence of the 2003 fires.



Photograph 5; The site of last years blast scaling; acceptably stable.



Photograph 6; The small patch of soil nails and mesh installed in 2005 to stabilise the 4WD track hairpin; performing well.



Photograph 7; Slip scars are still present in places above the lower 4WD track.



Photograph 8; Slip scars are also still present in places above the base track.



Photograph 9; Another slip scar above the base track.



Photograph 10; Good remedial repair to a dropout below the lower 4WD track.



Photograph 11; Erosion control work on summit.

Recommendations:

Although the ongoing rockfall risk to individuals on most of Mauao's tracks appears acceptable, the calculated fatality return periods (in the order of ten's of years) might still be deemed unacceptable politically.

The rockfall risk appears highest for a person under gullies on the Western Oruahine track, particularly if rock climbers were to 'walk off' rather than 'lower off'.

The rockfall risk to individual campers appears likely to be acceptable (with the exception of camping on the boundary row for a month or more per year); however, the return period and consequences of a rockfall entering the campground may not be acceptable. This is particularly so if significant budgets were to be spent on the proposed chalet development.

The current levels of rockfall risk can possibly be mitigated:

- A catch fence should be considered above the proposed campground chalet development.
- It is recommended that rockfall mitigation options be considered for the North West Oruahine Track, the highest risk area. Measures could include rock scaling and possibly the consideration of small catch fences.
- Public off track access to the steep upper slopes should be prohibited.
- Effective track closures may need to be in place before any TDC staff or contractors access the steep upper slopes off track. Any persons entering these areas must be suitably experienced, competent, trained, equipped, insured etc.
- Monitoring and inspection should continue six monthly.

Report on Herbicide Spraying

Thanks for also requesting us to carry out this work. Our two man team have sprayed all pampas bushes on the eastern and northern slopes, above the Waikorere and Oruahine tracks, in the two day period.

They reported that, while moving around in some areas, it is very difficult not to dislodge rocks, however, the vegetation is now at a density where the disturbed rocks tend to come to rest very quickly. The risk of triggering rockfall which could impact the tracks can be acceptably minimised by taking great care, not moving near the edge of the steepest areas (where rocks could start to bounce), and when crossing the most marginally stable areas, being aware when persons are on the tracks below.

Our next programmed monitoring will be due in the spring. If you have any queries or there are any developments in the meantime please contact me at any time.

Regards

§ 7(2)(a) - Privacy

Attached: Site records for Nov 2007 Slope Monitoring.



Area 1a; "Camp Bluff"

Installed post blasting, November 2003

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
3	→ 4		5211	5209	5208	<i>t possible</i>	5207	5208	5215	5210	5207	5208
3	→ 5		4320	4320	4321	<i>due to</i>	4320	4323	4323	4319	4322	4322
3	→ 6		5179	5180	5178	<i>public</i>	5180	5181	5178	5178	5178	5180
4	→ 5		2258	2260	2260	<i>below</i>	2260	2260	2258	2259	2261	2260

Area 2a; "Blasted Column"

Installed post blasting, November 2003

2a Columns

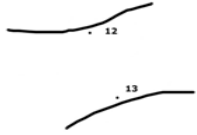


		Nov-03	Jan-04	Nov-04	Mar-05	Dec-05	Mar-06	Nov-06	Jul-07	Nov-07	Nov-08	Jun-09
8	→ 11		7917	7910	7907	not	7906	7915	7905	7906	7905	7910
8	→ 9			9968	9969	<i>possible</i>	9970	9968	9968	9964	9973	9971
10	→ 8			3111	3111	<i>due to</i>	3112	3126	3126	3126	3114	3114
10	→ 9			11636	11636	<i>public</i>	11633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

Area 2i; "Elephants Joint"

Installed March 2003

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
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Area 3a; "North East Bluff"

Installed March 2003

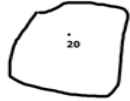
3a Bluff top



			Mar-03	Nov-03	Jan-04	Nov-04	1/03/2005	Dec-05	Mar-06	Nov-06	Jul-07	Nov-07	Nov-08	Jun-09
14	→	17	8110			8122	8124	8129	8129	8135	8130	8132	8128	#
15	→	17	5050			5050	5049	5050	5050	5056	5056	5054	5058	5063
16	→	17	4868			4874	4877	4879	4879	4868	4869	4880	4880	4882
15	→	16	3575			3581	3571	3577	3577	3575	3575	3573	3581	3583
15	→	14	7560			7478	7488	7485	7485	7484	7486	7486	7488	#

Blocks above Area 3d; "North Promentary" Installed March 2003

Above 3d



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

not recorded

Zone 6 Boulder 6b Installed December 2005

23 (LH outcrop) 22 (RH Outcrop)
21 (boulder)

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