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GEOTECHNICAL

Tauranga District Council
Private bag 12022
Tauranga

10 June 2013

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

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

Mauao Slopes; Monitoring Report for May 2013

This letter is to report on survey benchmark monitoring and the site geotechnical walkover completed on 15 May. Our previous monitoring was in September 2012.

A) Routine work items completed at this monitoring included:

- Discuss developments with Ranger.
- Walkover reviewing slopes from all tracks. Spring flows, slip movements, rockfall evidence, vegetation development etc. Recorded and photograph.
- Laser EDM survey carried out at 6 benchmark group locations on; West, North, East Bluffs and Zone 6.
- Sets of photos from locations A to M around summit for scour monitoring.
- Check previous slip sites re-vegetation, stability and tension crack development.

B) Summary of routine findings:

- No significant rockfall or slip events have been reported to the Ranger's staff since the previous monitoring.
- No significant movement was measured on the benchmark surveyed bluffs.
- Mauao had experienced a relatively heavy rainfall since the last monitoring and evidence was found on the inspection of reactivation of some soil slips and of relatively minor rockfall events.

B) Comments

As usual we have chosen a few areas on which to comment specifically:

The slip over the base track just to the north of the campground has again reactivated, resulting in a debris flow over the track which has been cleared. Photo 1.

The large but shallow soil slip on the southern slope has also reactivated. Photo 2.



Photo 1; Slip adjacent base track immediately N of campground.



Photo 2; Slip reactivated on southern slope.

Whilst looking for recent rockfall, one technique used is to roll over any suspect rock to see whether there is grass underneath. This inspection found small rocks which appear to have moved recently and come to rest on the open paddocks below the Waikorere track:



Photo 3-8; Recent small rock movements.

This type minor rockfall is ongoing but usually difficult to identify. As pointed out many times previously it presents highest risk to persons on the Oruahine track.

The following photograph shows a small slip/rockfall source area immediately above the Oruahine track. Above the steep cliffs there are many more similar potential source areas.



Photo 9; Small slip/rockfall source above Oruahine track.



Photo 10; 'Fresh' looking rock above southern campground.



Photo 11; Retaining wall at northern end of campground.



Photo 12; Retaining wall behind highest cabin.

The final couple of photos, 11 & 12 above, are of small retaining walls which could do with minor maintenance before they get any worse.

Please find appended our survey benchmark monitoring data. One data point (10-9 on the 'blasted column') appeared to indicate some small movement, however, the other triangulations in the vicinity have not moved so it is very likely a measurement error and we will check it next time.

In conclusion we are pleased to report that no unexpected hazards or issues of immediate concern were found on this monitoring visit.

The rockfall risk continues as previously and all persons using the tracks are of course exposed to some risk, however, the risk appears to be acceptable so long as the rockfall triggers which can be managed are managed (particularly persons moving around on the steep, loose upper slopes) and the weed spraying activities and rabbits are controlled to minimise scour exposure.

Please report any slips and/or rockfall events as soon as possible and we can incorporate them into the next monitoring visit or investigate immediately if required.

If you have any queries please don't hesitate to contact me at any time.

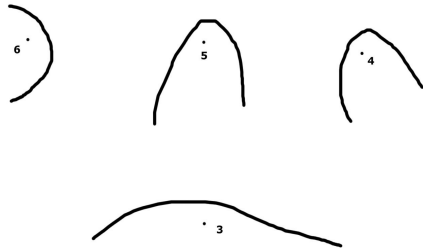
Regards

s 7(2)(a) - Privacy



Area 1a; "Camp Bluff"

1a The Camp Bluff



- 3 → 4
- 3 → 5
- 3 → 6
- 4 → 5

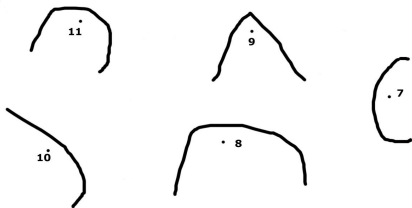
- 3 → 4
- 3 → 5
- 3 → 6
- 4 → 5

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
	5211	5209	5208	5208	5207	5208	5215	5210	5207	5208
	4320	4320	4321	4321	4320	4323	4323	4319	4322	4322
	5179	5180	5178	5178	5180	5181	5178	5178	5178	5180
	2258	2260	2260	2260	2260	2260	2258	2259	2261	2260
Dec-09	Jun-10	Dec-10	Jul-11	Mar-12	Sept 12	May-13				
5212	5209	5210	5206	5214	5206	5205				
4324	4324	4324	4320	4327	4320	4321				
5182	5183	5182	5178	5171	5182	5182				
2262	2263	2262	2263	2262	2263	2261				

Area 2a; "Blasted Column"

2a Columns



- 8 → 11
- 8 → 9
- 10 → 8
- 10 → 9
- 10 → 11

- 8 → 11
- 8 → 9
- 10 → 8
- 10 → 9
- 10 → 11

Nov-03	Jan-04	Nov-04	Mar-05	Dec-05	Mar-06	Nov-06	Jul-07	Nov-07	Nov-08	Jun-09
	7917	7910	7907		7906	7915	7905	7906	7905	7910
		9968	9969		9970	9968	9968	9964	9973	9971
		3111	3111		3112	3126	3126	3126	3114	3114
		11636	11636		11633	11635	11634	11634	11634	11630
		8325	8325		8325	8325	8325	8320	8327	8325
Dec-09	Jun-10	Dec-10	Jul-11	Mar-12	Sept 12	May-13				
7913	7913	7910	7912	7908	7912	7912				
9971	9968	9963	9966	9963	9964	9964				
3113	3115	3113	3115	3114	3113	3112				
11636	11636	11637	11632	11630	11634	11462*				
8326	8323	8330	8334	8336	8335	8320				

* suspect should be 11642. All others OK so check next time

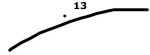
Area 2i; "Elephants Joint"

2i Elephant joint

12 → 13



Mar-03	Nov-03	Jan-04	Nov-04	Mar-05	Dec-05	Mar-06	Nov-06	Jul-07	Nov-07	Nov-08	Jun-09	Dec-09	Jun-10
2885		2884	2882	2887	2887	2887	2887	2885	2885	2887	2889	2883	2886

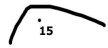
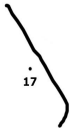


Dec-10	Jul-11	Mar-12	Sept 12	May-13
2885	2883	2886	2885	2881

3a Bluff top



			Mar-03	Nov-03	Nov-04	1/03/200	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	8130
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	7487

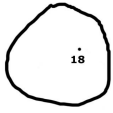


			Dec-09	Jun-10	Dec-10	Jul-11	Mar-12	Sept 12	May-13
14	→	17	8132	8129		8127	8129	8130	8132
15	→	17	5066	5064	5068	5058	5061	5056	5068
16	→	17	4879	4880	4877	4878		4880	4883
15	→	16	3579	3575	3576	3576	3572	3572	3574
15	→	14	7486	7482	7490	7493	7485	7490	7497

Blocks above Area 3d

North Promentary

Above 3d



			Mar-03	Nov-03	Nov-04	1/03/200	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
			Dec-09	Jun-10	Dec-10	Jul-11	Mar-12	Sept 12	May-13				
18	→	19	5255	5257	5254	5256	5248	5257	5253				
20	→	19	3378	3377	3378	3379	3378	3382	3380				
20	→	18	8062	8057	8052	8055	8050	8056	8056				

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	Jun-10	Dec-10	Jul-11	Mar-12	Sept 12	May-13
21	→	23	7560	7590	7615	7663	7639	7649	7655	7659	7660	7665	7671	7679	7699	7700
21	→	22	5799	5830	5865	5999	5891			5911	5914	5920	5929	5939	5959	5962