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GEOTECHNICAL

Tauranga District Council
Private bag 12022
Tauranga

12 January 2011

For the attention of s 7(2)(f)(ii)

Dear s 7(2)(f)(ii)

Mauao Slopes; Monitoring Report for December 2010

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

A) Routine work items completed included:

1. Discuss developments with s 7(2)(f)(ii)
2. Walkover reviewing slopes from all tracks. Spring flows, slip movements, rockfall evidence, vegetation development etc. Recorded and photograph.
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.

B) A summary of findings would be:

1. No significant rockfall or slip events have been reported to or observed by s 7(2)(f)(ii) s 7(2)(f)(ii) since the previous monitoring (June 2010).
2. This walkover as usual found occasional evidence of recent very minor rockfall, which is as would be expected (small rock fragments on tracks & rearrangements on bluff ledges).
3. Erosional scour continues as anticipated on steep colluvial ground. where there is little vegetation cover and exposed sand. That said, the majority of vegetation has been very well managed over the last few years and cover continues to improve.
4. The gorse spraying operation can locally expose the colluvium to increased scour. The balance here is difficult to achieve but I would recommend that spraying should be as controlled as possible. Barren sand will scour quickly and exposed rocks on over steep ground above tracks pose obvious risks.
5. The May 2005 slips now appear to have locked up and in general are re-vegetating well, except for very localised steep scarps, which are inevitable and pose no risk.
6. The assessed level of rockfall risk has not changed since our previous assessments.

C) Discussion & detailed report:

The small 'camp bluff ledge' we monitor closely as a typical example was inspected and as usual showed a rearrangement of the rock debris.

Photo 1; Camp Bluff ledge June 2010

Photo 2; Camp Bluff ledge December 2010

The following photograph of a bluff above the eastern end of the Oruahine track shows how spraying to eradicate gorse has killed all vegetation and increased scour on over-steep colluvial slopes immediately above the track.

This 'full kill' effect should be avoided if possible, unless the increased rockfall risk is on balance considered preferable.

Photo 3; Dead gorse above Oruahine track.

The following two photos show small changes on slopes above the Waikorere track from June 2010 to December 2010.

Photo 4; June 2010

Photo 5; December 2010

As we don't have any very significant incidents or observations to report following this recent monitoring visit, we though it might be interesting to put some monitoring photographs from 2005 side by side with ones of the same locations at present.

Starting with a close up of one of the bluffs above the Waikorere track, followed by a bluff with a tree stump above the Oruahine track:

Photo 6; 2005

Photo 7; 2010

Photo 8; 2005

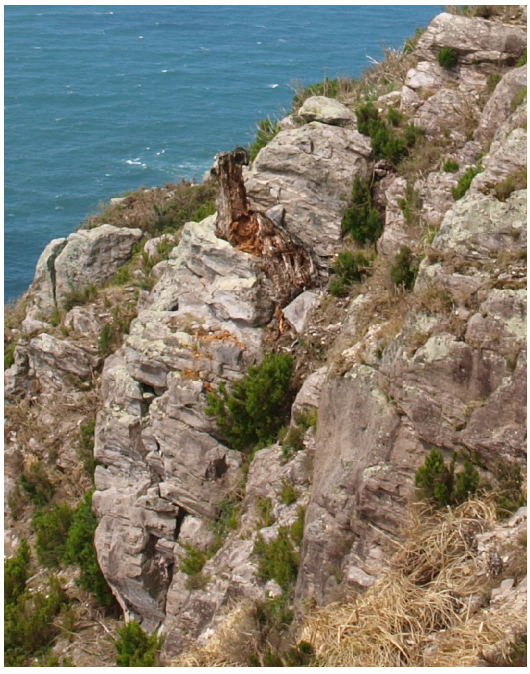


Photo 9; 2010

These photographs above show how the stump of a mature tree has rotted down very significantly.

This process can allow previously pushed open joints to move as the rock load crushes the rotten timber. It also opens up new entries for water.

The following photos show small changes in bluffs above the Waikorere & Oruahine tracks.

Photo 10; 2005

Photo 11; 2010

Photo 12; 2005

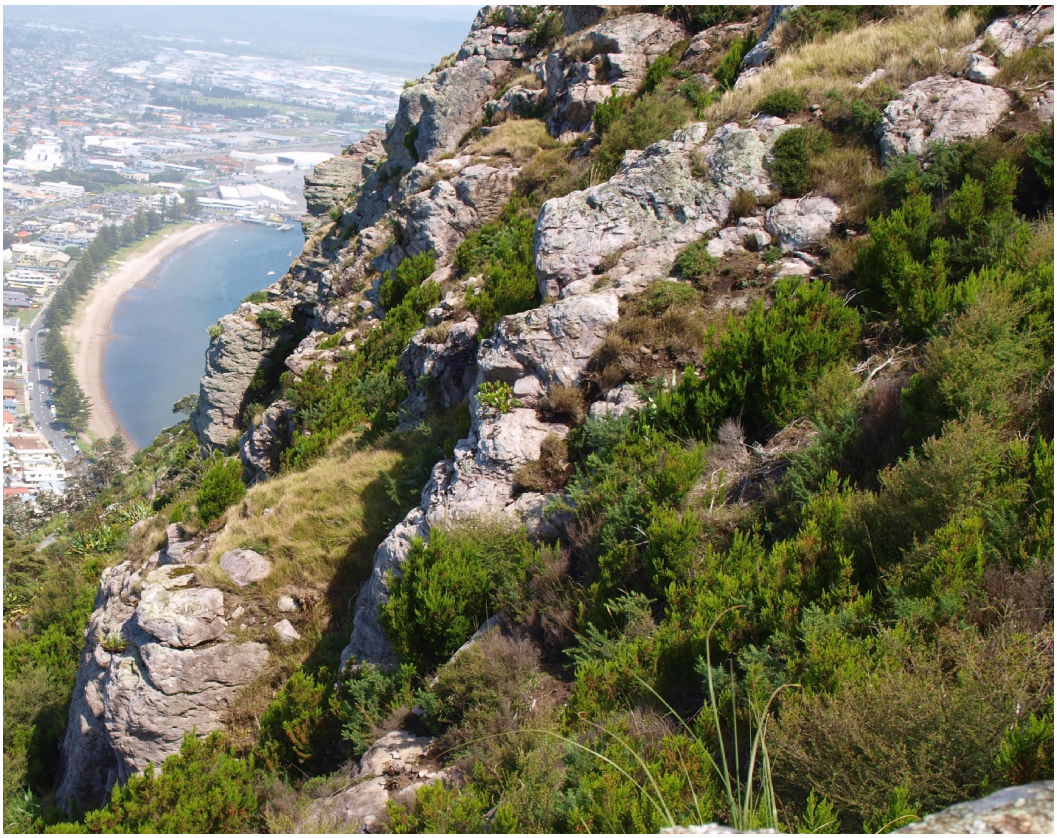


Photo 13; 2010

Photo 14; 2005

Photo 15; 2010

Attached to this report are our survey benchmark measurements.

Our next programmed monitoring will be due in June 2011 and I will contact you shortly before if we haven't heard from you.

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)(f)(ii)

Attached: Site records for December 2010 Slope Monitoring.

Avalon Industrial Services Ltd

Mauao Survey Benchmark Monitoring **December 2010**

Area 1a; "Camp Bluff"

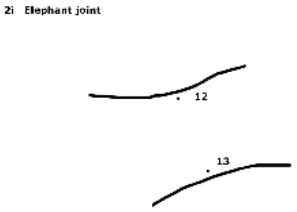
Distance measurement mm

			Nov-03	Jan-04	Nov-04	Mar-05	Dec-05	Mar-06	Nov-06	Jul-07	Nov-07	Nov-08	Jun-09	Dec-09	Jun-10	Dec-10
3	→	4		5211	5209	5208	5208	5207	5208	5215	5210	5207	5208	5212	5209	5210
3	→	5		4320	4320	4321	4321	4320	4323	4323	4319	4322	4322	4324	4324	4324
3	→	6		5179	5180	5178	5178	5180	5181	5178	5178	5178	5180	5182	5183	5182
4	→	5		2258	2260	2260	2260	2260	2260	2258	2259	2261	2260	2262	2263	2262

Area 2a; "Blasted Column"

			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	Dec-10
8	→	11		7917	7910	7907		7906	7915	7905	7906	7905	7910	7913	7913	7910
8	→	9			9968	9969		9970	9968	9968	9964	9973	9971	9971	9968	9963
10	→	8			3111	3111		3112	3126	3126	3126	3114	3114	3113	3115	3113
10	→	9			11636	11636		11633	11635	11634	11634	11634	11630	11636	11636	11637
10	→	11			8325	8325		8325	8325	8325	8320	8327	8325	8326	8323	8330

Area 2i; "Elephants Joint"



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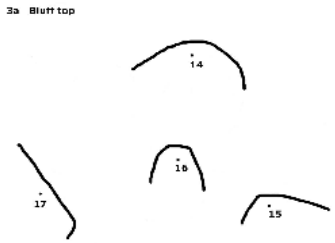
Mar-03	Nov-03	Jan-04	Nov-04	Mar-05	Dec-05	Mar-06	Nov-06	Jul-07	Nov-07	Nov-08	Jun-09	Dec-09	Jun-10	Dec-10
2885		2884	2882	2887	2887	2887	2887	2885	2885	2887	2889	2883	2886	2885

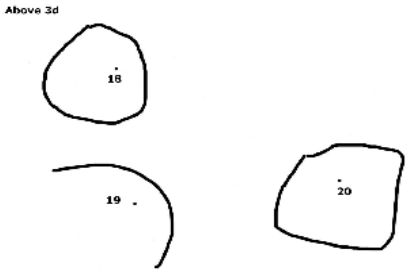
Area 3a; "North East Bluff"



			Mar-03	Nov-03	Nov-04	1/03/200	Dec-05	Mar-06	Nov-06	Jul-07	Nov-07	Nov-08	Jun-09	Dec-09	Jun-10	Dec-10
14	➔	17	8110		8122	8124	8129	8129	8135	8130	8132	8128	8130	8132	8129	
15	➔	17	5050		5050	5049	5050	5050	5056	5056	5054	5058	5063	5066	5064	5068
16	➔	17	4868		4874	4877	4879	4879	4868	4869	4880	4880	4882	4879	4880	4877
15	➔	16	3575		3581	3571	3577	3577	3575	3575	3573	3581	3583	3579	3575	3576
15	➔	14	7560		7478	7488	7485	7485	7484	7486	7486	7488	7487	7486	7482	7490

Blocks above Area 3d

North Promentary



			Mar-03	Nov-03	Nov-04	1/03/200	Dec-05	Mar-06	Nov-06	Jul-07	Nov-07	Nov-08	Jun-09	Dec-09	Jun-10	Dec-10
18	➔	19	5248		5265	5256	5256	5254		5253	5253	5255	5256	5255	5257	5254
20	➔	19	3380		3385	3373	3376	3376	3377	3375	3374	3376	3379	3378	3377	3378
20	➔	18	8038		8065	8050	8056	8050	8053	8053	8054	8057	8056	8062	8057	8052

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
21	➔	23	7560	7590	7615	7663	7639	7649	7655	7659	7660	7665
21	➔	22	5799	5830	5865	5999	5891			5911	5914	5920