



PH. 07 846 1686 / FX. 07 846 1016  
PO. BOX 5187 / FRANKTON / HAMILTON / NEW ZEALAND  
[WWW.AVALONLTD.CO.NZ](http://WWW.AVALONLTD.CO.NZ)

GEOTECHNICAL

Tauranga District Council  
Private bag 12022  
Tauranga

17 June 2015

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

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

### **Mauao Slopes; Monitoring Report for June 2015**

This letter is to report on survey benchmark monitoring in June 2015 and the site geotechnical walkover on 15 April 2015.

#### **A) 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 & rockfall monitoring.
- Check previous soil slip sites for re-vegetation, stability and tension crack development.

#### **B) Summary of 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.

#### **B) Comments**

As part of this monitoring we spent desk time graphically plotting each leg of the survey data over the previous 12 years to give a clear visual check which re-confirmed that there has been very little large scale movement within the bluffs being monitored.

The walkover found a few location which indicate some of the ongoing rockfall:



Photograph #1. "Hole" in soil indicating boulder released over Oruahine track.



Photograph #2. "Fresh" looking boulder on lower slopes. View in Photo #3, below, is looking up from this location



Photograph #3. Boulder of Photo #2 is in lower left foreground.



Photograph #4. Small fresh looking rock on lower slopes.



Photograph #5. Small fresh looking rock on lower slopes.



Photograph #6. Small fresh looking rock on lower slopes.

The survey and monitoring walkover are generating many many more photographs than are presented in each report and after each visit these are archived and cross referenced as part of the analysis before presenting these reports. Typically this analysis work takes a day or more of office time but sometimes, as was the case with the recent set, there are few obvious or significant changes found.

With your agreement, as part of the next monitoring visit we would like to propose that we increase the quality of the data by including some UAV aerial photography of the upper bluffs in elevation view and the lower slopes in plan view. Avalon has started successfully trialling this technique on some other sites and it is proving very useful. Any such work at Mauao would be at very low level but of course still coordinated with ATC at the Airport.

Attached to this report are our survey benchmark measurements.

Our next programmed monitoring will be due in November/December and I will contact you shortly before if we haven't heard from you and look forward to discussing the UAV photography proposal.

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

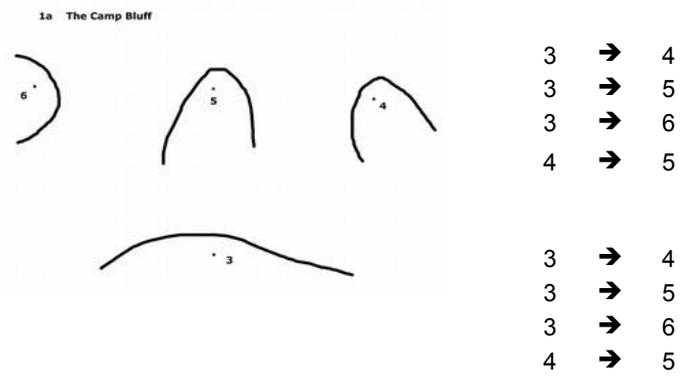
Regards

s 7(2)(a) f Privacy



**June 2015**

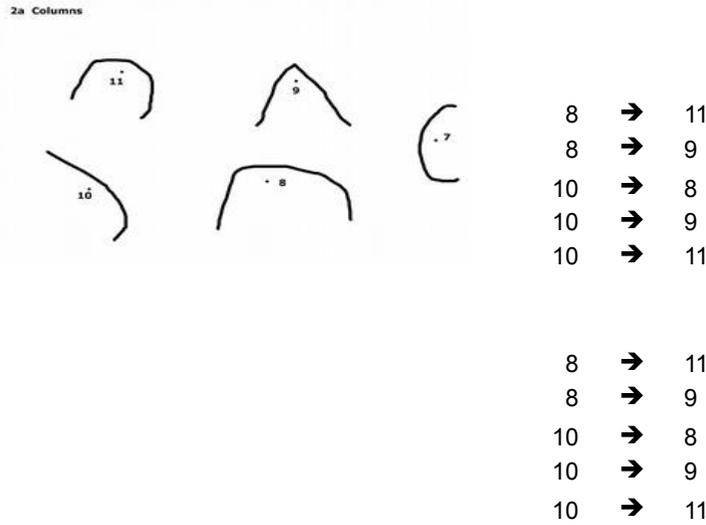
**Area 1a; "Camp Bluff"**



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
	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	Dec-13	Aug-14	Jun-15
5212	5209	5210	5206	5214	5206	5205	5209	5211	5207
4324	4324	4324	4320	4327	4320	4321	4320	4324	4322
5182	5183	5182	5178	5171	5182	5182	5182	5178	5179
2262	2263	2262	2263	2262	2263	2261	2261	2260	2256



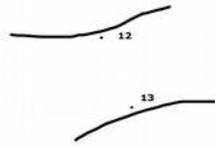
Nov-03	Jan-04	Nov-04	Mar-05	Dec-05	Mar-06	Nov-06	Jul-07	Nov-07	Nov-08	Jun-09
	7917	7910	7907		7906	7915	7905	7906	7905	7910
		9968	9969		9970	9968	9968	9964	9973	9971
		3111	3111		3112	3126	3126	3126	3114	3114
		11636	11636		11633	11635	11634	11634	11634	11630
		8325	8325		8325	8325	8325	8320	8327	8325

Dec-09	Jun-10	Dec-10	Jul-11	Mar-12	Sept 12	May-13	Dec-13	Aug-14	Jun-15
7913	7913	7910	7912	7908	7912	7912	7912	7912	7913
9971	9968	9963	9966	9963	9964	9964	9964	9966	9976
3113	3115	3113	3115	3114	3113	3112	3112	3112	3113
11636	11636	11637	11632	11630	11634	11642	11637	11634	11637
8326	8323	8330	8334	8336	8335	8320	8320	8318	8319

Area 2i: "Elephants Joint"

2i Elephant joint

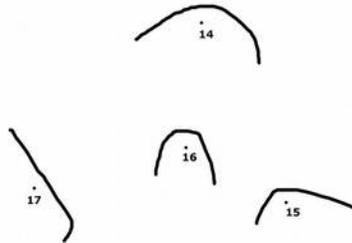
12 → 13



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	Dec-13	Aug-14	Jun-15						
2885	2883	2886	2885	2881	2882	n/a	2881						

3a Bluff top



14 → 17  
 15 → 17  
 16 → 17  
 15 → 16  
 15 → 14

Mar-03	Nov-03	Nov-04	1/03/200	Dec-05	Mar-06	Nov-06	Jul-07	Nov-07	Nov-08	Jun-09
8110		8122	8124	8129	8129	8135	8130	8132	8128	8130
5050		5050	5049	5050	5050	5056	5056	5054	5058	5063
4868		4874	4877	4879	4879	4868	4869	4880	4880	4882
3575		3581	3571	3577	3577	3575	3575	3573	3581	3583
7560		7478	7488	7485	7485	7484	7486	7486	7488	7487

14 → 17  
 15 → 17  
 16 → 17  
 15 → 16  
 15 → 14

Dec-09	Jun-10	Dec-10	Jul-11	Mar-12	Sept 12	May-13	Dec-13	Aug-14	Jun-15
8132	8129		8127	8129	8130	8132	8130	8127	8127
5066	5064	5068	5058	5061	5056	5068	5059	5060	5052
4879	4880	4877	4878		4880	4883	4877	4879	4873
3579	3575	3576	3576	3572	3572	3574	3574	3573	3573
7486	7482	7490	7493	7485	7490	7497	7491	7490	7492

