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GEOTECHNICAL

Tauranga District Council
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Tauranga

24 April 2017

For the attention of s 7(2)(f)(ii) - Protection of public officials - Mauao

Dear s 7(2)(f)(i

Mauao Slopes; Monitoring Report for April 2017

This letter is to report the survey benchmark monitoring, site geotechnical walkover, rockfall and slip developments since the previous monitoring.

A) Recent rockfall and slips

25 October 2016 – rockfall reported by a member of the public

> *"We started from the mount surf club side and would've been almost to the end of the Oruahine track, also it was just one large rock that zoomed right in front of me past my head rather than a shower of them, maybe dinner plate size."*

In response to this October rockfall TCC closed the track and the following day Avalon's engineering geolologist inspected the track and carried out a drone flight inspection.

The rockfall location was described as around the centrepoint of the steepest rock faces over the Oruahine track but the exact rockfall source location could not be found.

The drone inspection found no signs of likely imminent further rockfall therefore no further follow up was required as it was considered that track users would be at no higher risk than those prior to this event.

9 March 2017 – rockfall reported by a member of the public

> *"a rock of approximately 900 x 700 x 500 millimeters came down at speed from the northern bluffs and crossed the Oruahine track at speed bouncing on the outside edge of the track before coming to rest approximately 50 meters below in the vegetation"*

TCC implemented an immediate track closure and Avalon made a site visit the following day. The rock had impacted the edge of the Oruahine track leaving a hole around 500x500mm and 500mm deep.

The rock was located at rest in the scrub around 30m below track level.

Photo #1; Rock which crossed track 9 March 2017.

A drone inspection was carried out and the slope above the track hole was climbed, following indications of the rocks path. The source location was found to be a relatively small bluff high on the slope. 1 to 1.5 cubic metres of boulders was found that had moved but not fallen and were maginally stable. These were subsequently scaled in a controlled operation with Oruahine and base track closures, after which the tracks were reopened.

Of particular note with this fall was the fact that the source location was in a relatively low risk area on a slope with relatively few outcrops. This reinforces the fact that our risk estimates are based on probabilities and the improbable remains possible.

3 April 2017 – slips and rockfalls due to intense rainfall event

In the two weeks prior to 13 April Mauao received around 250mm rainfall, which resulted in a number of minor slips and rockfalls and one major drop-out slip which has closed the base track.

Avalon's engineering geologist visited the site on Friday 14th April. Many springs were active around the base areas and there had been a few small (1m3) slips from the basetrack cut slopes.

The one major slip was a drop out of the slope below the southern section of the base track resulting in over 10m of track loss and will take significant time and resources to repair.

Photo #2; Base track drop out 5 April 2017

The base track corner slope which was reported in detail at the last monitoring (October 2016) and subsequently lightly scaled but has again been badly scoured in this rainfall event and it was deemed prudent to scale it again.

Photo #3; Western side Base track slip.

During the previous scaling we observed the rockfall trajectories which revealed that a fence to mitigate the risk at this location would need to be 4m in height.

For a longer term solution we could install a fence with posts at 3m centres and 8mm wire rope reinforced DT rockfall mesh. The bottom panel would be designed to allow cleaning out and replacement occasionally. The posts would be around 100mm diameter, founded at

2m depth. The top of the posts would be reinforced via wire ropes running back up behind the crest of the slipped area and anchored via trees or ground anchorages.

Erosion control on the slope was considered as an alternative option but would cost double the cost of a fence.

The length of fence required would be around 25 linear metres. The fence budget cost as described would be around $40,000.

B) Routine monitoring

- The walkover found the springs around the base to be very active.
- There were a few indications of ongoing minor rockfall from the upper rock bluffs.
- The active slips at high levels on the south eastern slopes showed some reactivation in the recent rainfall event but nothing major.
- A close inspection was made of the areas above the campground but no indications of ground movement were found.

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

Regards

[redacted]
s 7(2)(a) - Privacy