6 April 2018

Natural Hazards Advisor
Bay of Plenty Regional Council Toi Moana
PO Box 364
Whakatāne 3158, New Zealand

Attention: Mark Ivamy

1 Fairway Drive, Avalon
Lower Hutt 5010
PO Box 30368
Lower Hutt 5040
New Zealand
T +64-4-570 1444
F +64-4-570 4600
www.gns.cri.nz

Dear Mark Ivamy,

Interim results on active faults around the Omokoroa-Katikati development sites, Tauranga

1.0 SUMMARY

To assess the potential presence or absence of active faults at the Katikati and Omokoroa development sites, we: reviewed the existing published and unpublished literature and maps of the area; reviewed 1940s and 1960s aerial photographs (NZ Aerial Mapping, see references for list); and analysed the landforms from a digital elevation model derived from Light Detecting and Ranging (LiDAR) data (provided by Bay of Plenty Regional Council).

The Katikati site overlies mostly old river deposits (Tauranga Group; 128,000 years to 2 million years old), with parts of the sites overlying low terraces containing younger river sediments (Holocene; 0 to ~12,000 years) (Figures 1 and 2). The Omokoroa site overlies both Tauranga Group sediments and volcanic rock (aged around 2 million years) (Figures 1 and 2). Prior to this study, no active faults at those sites had been identified through geological mapping (Edbrooke, 2001; Heron, 2014) and active fault mapping (New Zealand Active Fault Database, Langridge et al., 2016).

We cannot identify any geomorphic features in the landforms at either the Katikati or Omokoroa sites that can be classified as active faults. There may be old faults (such as the Tuapiro Fault; Figure 1) that are buried beneath the sediments and volcanic rock at these sites, but these would not likely have ruptured in at least the last 128, 000 years, as the surfaces of that age does not seem to be displaced by any faults.

There are also no known offshore faults near the development sites (Lamarche and Barnes, 2005).

1.1 GEOLOGY

The Omokoroa and Katikati development sites lie within the Tauranga basin, a depression which has been infilled with river and estuarine sediment, ignimbrite and volcanic-derived sediment since around 2 million years (Brathwaite & Christie 1996, Briggs et al. 1996).

The development sites at Omokoroa and Katikati are flanked to the west by the Kaimai Range, which comprises volcanic rocks that erupted nearby around 2-5 million years ago (Coromandel Group). The sites themselves overlie fluvial sediments of gravel, sand, silt and loess (Tauranga Group) that were deposited between 2 million years and around 128,000 years ago (see Figure 1). The Omokoroa development site overlies both Tauranga and Coromandel group rocks.

1.2 KATIKATI SITES

The western-most site at Katikati is located on higher hill terrain of alluvial fan sand and silt that is composed mostly of older Tauranga Group sediment aged between around 500,000 and 128,000 years old, with a smaller section of the site located on a Holocene valley (~12,000 years old or younger). The eastern sites overlie topographically lower hill terrain that is composed of younger Tauranga Group alluvial sediments of sand and silt; although the absolute maximum age of these sediments are 2 million years it is likely to be younger than those of the western-most Katikati development site but not younger than 128,000 years.

The closest known mapped faults to the Katikati development site is the Tuapiro Fault, which lies about 600 m west to the west of the sites (Figure 1); it is a concealed fault the location of which is inferred from the presence of warm springs, a steep gradient in Bouguer gravity data and absence of sediments in drillholes to the west of the fault (Brathwaite & Christie 1996). We do not see the surface expression of this fault on the digital elevation model generated from LiDAR data and the aerial photos; this implies that the Tuapiro fault and any other potentially buried fault in the area have not ruptured the ground surface in the last 128,000 years.

1.3 OMOKOROA SITE

The development site at Omokoroa overlies Coromandel Group ignimbrite (2-5 million years) and Tauranga Group (2 million years to 128,000 years) alluvial gravel, sand and silt. The nearest faults to this site are the Tuapiro and Hauraki faults that are 14 km and 16 km to the north and west respectively (Figure 1). Neither of those faults has been described as active in the literature and they do not show recent signs of movement based on our geomorphic study.

We cannot see visible evidence of geomorphic features that can be classified as an active fault at the Omokoroa site or in the surrounding area.

2.0 CONCLUSIONS

We conclude that no active faults have been identified in the present-day geomorphology at both the Katikati and Omokoroa development sites. The buried Tuapiro Fault that lies west of the Katikati site and other potentially buried faults that may lay in close proximity to the sites

last moved before 128,000 years ago, and thus are not considered active under the current definition of active faults in the New Zealand Active fault database (Langridge et al, 2016).

3.0 REFERENCES

Brathwaite RL, Christie AB. 1996. Geology of the Waihi area: part sheets T13 and U13 [map]. Lower Hutt (NZ): Institute of Geological & Nuclear Sciences. 1 folded map + 64 p., scale 1:50,000. (Institute of Geological & Nuclear Sciences geological map; 21).

Briggs RM, Hall GJ, Harmsworth GR, Hollis AG, Houghton BF, Hughes GR, Morgan MD, Whitbread-Edwards AR. 1996. Geology of the Tauranga area: sheet U14 [map]. Hamilton (NZ): University of Waikato. 1 folded map + 57 p., scale 1:50,000. (Occasional report / Department of Earth Sciences, University of Waikato; 22).

Edbrooke SW. 2001. Geology of the Auckland area [map]. Lower Hutt (NZ): Institute of Geological & Nuclear Sciences Limited. 1 folded map + 74 p., scale 1:250,000. (Institute of Geological & Nuclear Sciences 1:250,000 geological map; 3).

Heron DW, custodian. 2014. Geological map of New Zealand 1:250,000. Lower Hutt (NZ): GNS Science. 1 CD. (GNS Science geological map; 1).

Lamarche G, Barnes PM. 2005. Fault characterisation and earthquake source identification in the Offshore Bay of Plenty. Wellington (NZ): NIWA. Client Report No.: WLG2205-51.

Langridge RM, Ries WF, Litchfield NJ, Villamor P, Van Dissen RJ, Barrell DJA, Rattenbury MS, Heron DW, Haubrock S, Townsend DB; et al. 2016. The New Zealand Active Faults Database. New Zealand Journal of Geology and Geophysics. 59(1):86-96. doi:10.1080/00288306.2015.1112818.

New Zealand Aerial Mapping photos 1940s: Run and photo numbers - 3000 (19-25), 3001 (18-25), 3002 (18-27), 3006 (15-22)

New Zealand Aerial Mapping photos 1960s: Run and photo numbers - 499 (33-40), 495 (33-43), 493 (84-91), 498 (28-36)

Yours sincerely

Julie Lee
Scientist

Pilar Villamor
Senior Scientist

This report was undertaken by Julie Lee and Pilar Villamor. It was internally reviewed by Rob Langridge.

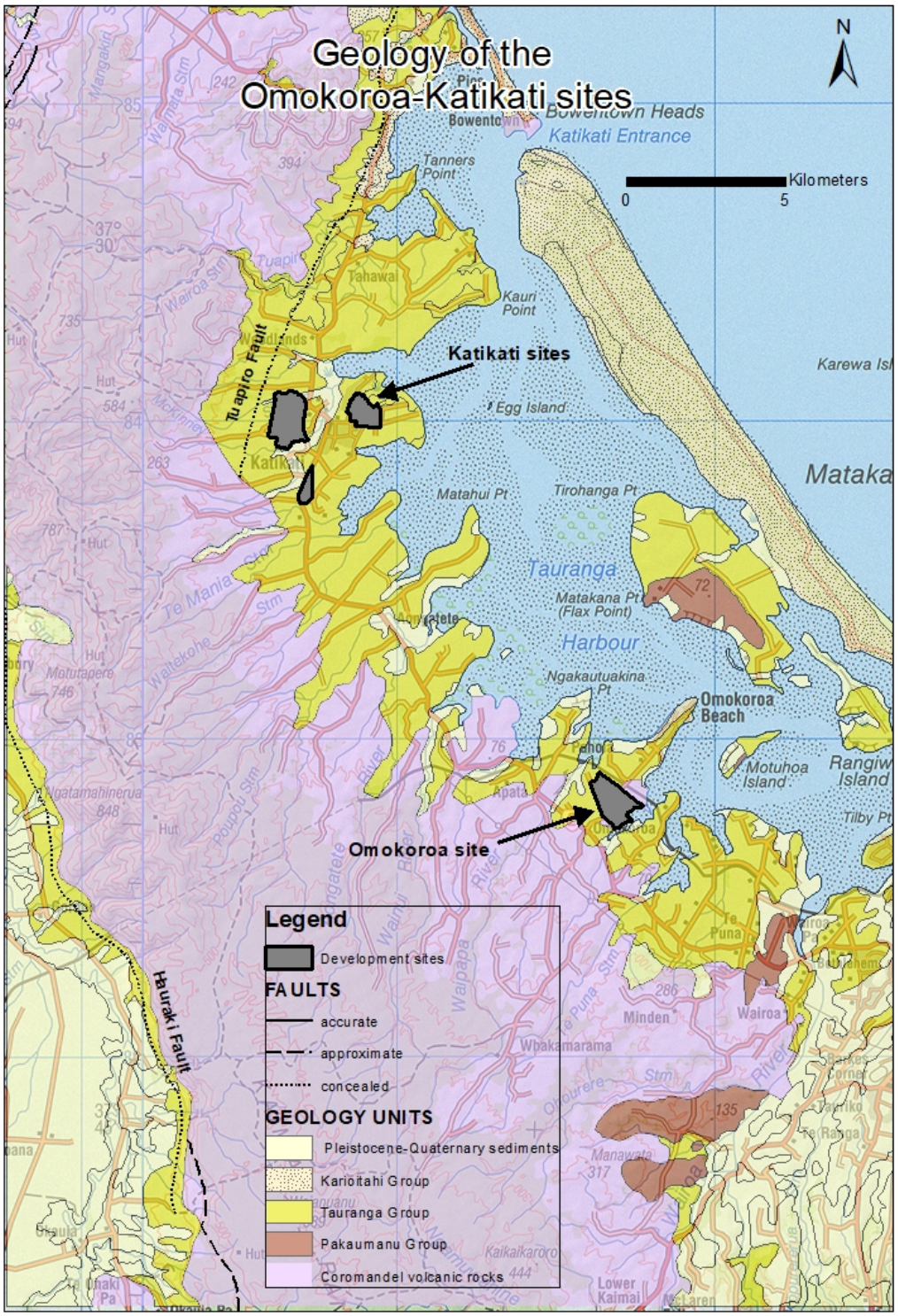

Figure 1 A generalised geological map of the area surrounding the Katikati and Omokoroa development sites (grey polygons). Volcanic rock of ignimbrite, lava flows, domes and other volcaniclastic sediment (2-5 Million years) form the Kaimai Range, which is bound to the west by the Hauraki Fault. Most of the volcanic rock was sourced from the Coromandel area although there are some outcrops of Pakaumanu Group ignimbrite that originated from Taupo area. The Tauranga Basin refers to the area east of the Kaimai Range where younger 2 Million years to 128,000 year old alluvial sediment infilled the depression. The geology and ages of the geological units are from Heron (2014).

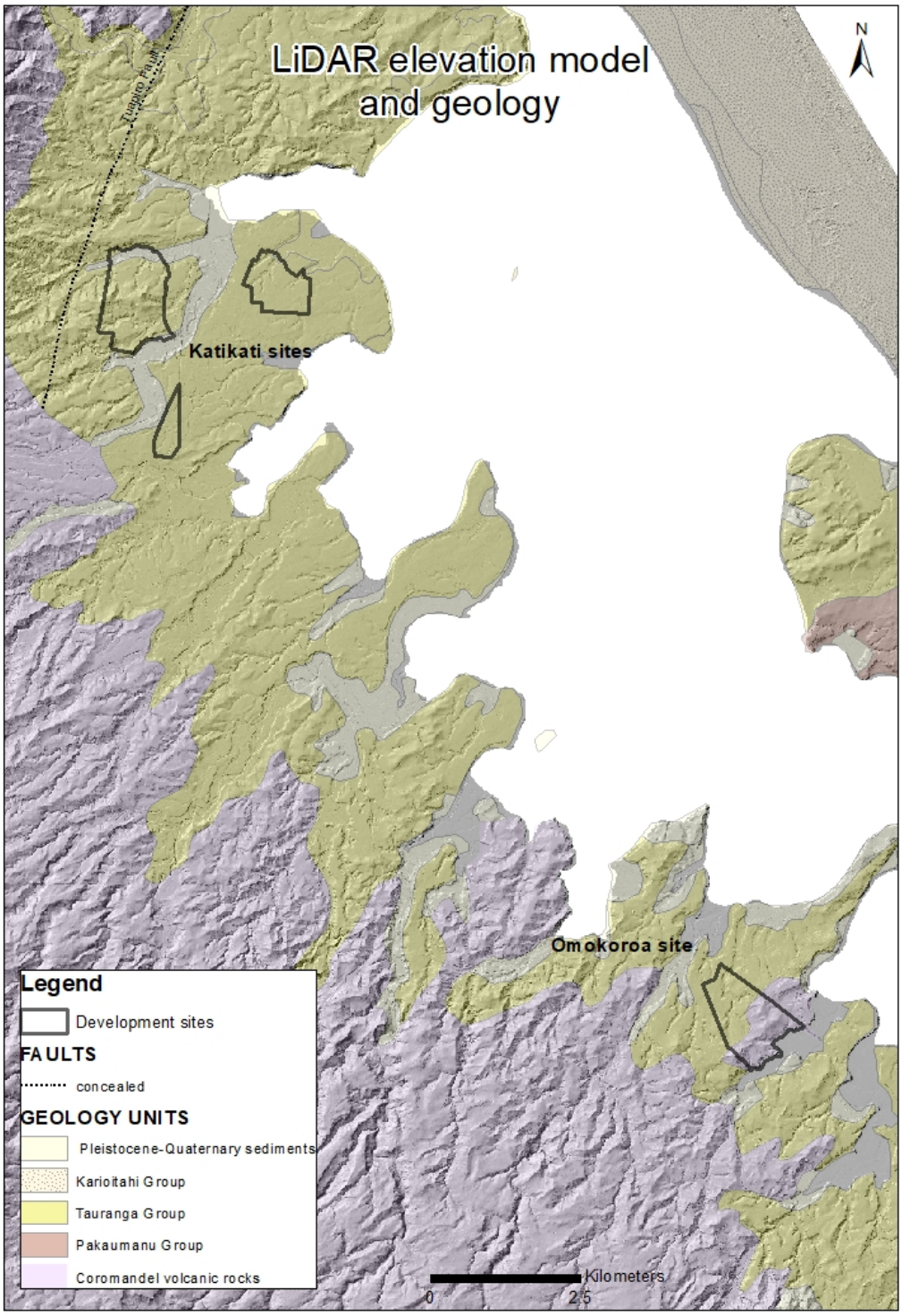

Figure 2 A 2 m LiDAR elevation model with geology for the Omokoroa and Katikati development sites. The landforms show the Coromandel volcanic rocks (purple) dip down towards the coast. Younger fan and river sediments (dark and light yellow) are deposited where streams and rivers carry their bedload downstream. There is no evidence of active faulting (recent displacement of the ground surface by faults) at the study sites. The geology is from Heron (2014).