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Dear Rob,

Matata debris-flow mapping

A series of three pairs of map sheets have been prepared by GNS Science to assist Whakatane District Council in planning options for future management of the debris-flow hazard around Matata that was revealed by the events of May 2005. These maps show:

1. the identifiable debris-flow and debris avalanche fans on the coastal plain at Matata between the mouths of Herepuru Stream in the west and Tarawera River in the east;
2. the extents of the 2005 Matata debris flows and debris avalanches on the coastal plain;
3. the areas on the coastal plain in the vicinity of Matata likely to be affected by future debris flows or debris avalanches.

These geomorphic maps were produced by William Ries, under supervision by Dougal Townsend and Mauri McSaveney, through GIS analysis of LiDAR data, aided by examination of orthophoto images and historical aerial photographs. The mapping has not been field verified.

The maps are presented at A3 size and 1:10,000 scale in pairs, with Map 1 covering the coastal plain northwest of Awatarariki Stream and Map 2 covering the Matata area from Awatarariki Stream to south of Waitepuru Stream.

The following brief explanatory notes are provided to assist in interpreting the maps.

1 The extent of past debris flows and debris avalanches

A pair of maps shows the estimated distribution of deposits from past debris flows and debris avalanches accumulated over the last 7000 years or so. The time for debris accumulation is based on knowledge that world sea level rose to near its present level

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about 6500 to 7000 years ago and the former coastal cliffs that form the escarpment behind Matata would not have been trimmed by coastal erosion before this time. Debris flows occurred in the area before 7000 years ago, but their deposits today lie offshore.

Debris-flow and debris-avalanche deposits have not been differentiated in these maps because at Matata there is no difference in process between a debris flow and a debris avalanche. The difference between the two is in the morphology of the land on which they flow: a debris flow follows a defined channel; a debris avalanche has no channel to follow. On the fans forming the coastal plain around Matata, there are no confining channels to follow, and both debris flows and debris avalanches can spread widely.

The landscape of the coastal plain at Matata consists of three dominant landforms:

- a) a series of coalescing debris-flow and debris-avalanche fans along the foot of an escarpment which is a former sea cliff;
- b) a sandy beach and coastal dunes;
- c) an intervening wetland between the fans and the dunes. In many places dunes overlap onto fans and form barriers to fan extension.

Only the fans have been shown on the maps.

2 Extent of the 2005 debris flows and debris avalanches

This pair of maps was based largely on what could be recognised on the Whakatane District Council Matata Disaster aerial photographs taken 24–25 May 2005. Debris-flow and debris-avalanche deposits were separately identified, along with the debris-flood deposits that extend beyond them into the wetland areas.

The transition from debris flow to debris flood has little geomorphic expression to recognise on the available aerial photographs and may not be accurately located in some areas.

3 Areas likely to be affected by future debris flows and debris avalanches

These maps are hazard maps and not risk maps; they have been prepared without regard (or knowledge) of the probability of occurrence of debris flows or debris avalanches of the extents shown. In many locations, the limit of extent is imposed by a natural (dune) or artificial (bund, road or rail embankment) barrier and remains the same almost irrespective of the magnitude of the event (for events that reach the barrier).

At Waitepuru Stream, GNS Science has assumed that a future debris flow could exceed the capacity of the existing debris-flow mitigation work and spill beyond it. The extent of the spill has been estimated without knowledge of the design or capacity of the work and not intended to be accurate. It is shown to indicate that although the debris-flow **risk** may have been reduced by the works, there is still a debris-flow **hazard** from this source which may extend into Matata.

Map accuracy and useage

The six map sheets have been prepared to assist Whakatane Disrtrict Council in planning options for future management of a recently recognised hazard around Matata that was highlighted by the events of May 2005. The maps have been prepared with a generalised regard for topography but without regard for the ephemeral features of buildings and vegetation. They therefore should not be used at a property-specific level. Their purpose is to show the distribution and proportions of Matata exposed to some risk from debris flows and debris avalanches.

It was beyond the scope of available data for GNS Science to estimate what the risk of the mapped hazard, but such information may be required by Whakatane District Council before decisions are made as to whether the risk is acceptable or unacceptable.

Summary

A series of three A3 map pairs at a scale of 1:10,000 have been prepared for Whakatane District Council to show for the area around Matata:

- the areal extent of the deposits of debris flows and debris avalanches;
- the areal extent of deposits from the May 2005 debris flow events;
- the areal extent of likely debris-flow and debris avalanche hazard. It should be noted that this map pair presents hazard, but does not present the risk of the hazard.

The purpose of these maps is to assist Whakatane District Council in planning options for future Matata land management. The maps are unsuitable for use at a property-specific level.

Yours sincerely

William Ries, MSc
GIS Technician

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Senior engineering geomorphologist

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