



MANAGING DEBRIS FLOW AND LANDSLIDE HAZARDS FROM THE MATATĀ ESCARPMENT

*Summary - Debris Flow and Landslide Risk Study
and Management Options*

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WHAKATĀNE DISTRICT COUNCIL

Civic Centre, Commerce Street,
Private Bag 1002 Whakatāne 3158

P: 07 306 0500 **F:** 07 307 0718

E: information@whakatane.govt.nz

W: www.whakatane.govt.nz

INTRODUCTION

On 18 May 2005, Matatā was severely impacted by large debris flows generated by intense rainfall in the hill country catchments behind the town. The debris flows and their associated flood waters destroyed 27 homes and damaged a further 87 properties, with the most significant impacts confined to the fanheads of the Awatarariki and Waitepuru Streams. A number of landslides also occurred along the Matatā escarpment. Between May 2010 and June 2011, a series of heavy rainfall events triggered further landslides on the Matatā Escarpment and adjacent hills. No debris flows were generated.

In late 2012, the Whakatāne District Council (the Council) accepted expert advice that no feasible engineering solution to mitigate against debris flows from the Awatarariki Stream catchment. In light of the work then underway to assess Whakatāne and Ōhope Escarpment landslide hazards, Tonkin & Taylor Limited (T&T) were commissioned to undertake a Quantitative Landslide Risk Assessment of the Matatā Escarpment. The Council intends to use the study findings provided to develop an understanding of landslide and debris flow hazards in Matatā and the risks

that future events pose to residents and potential future developments. The study area stretches from the western end of the Awatarariki Stream debris fan to 71 Manawahe Road in the east and Arawa Street in the north.

This summary is produced for the owners of properties which are potentially exposed to debris flow and landslide hazards from the Matatā Escarpment. It covers the key findings of the draft T&T study of debris flows and landslide hazard susceptibility; and the risks those hazards may represent for people living in the affected areas. It also sets out possible approaches suggested by environmental consultants Boffa Miskell Limited, which the Council and property owners may take to reduce the risks to life and property to more acceptable levels.

The Council is seeking feedback from property owners on the options they would like to see developed to reduce the loss of life risk landslides (including debris flows) represent to people living or working in close proximity to the base of the escarpment, or on known debris flow fanhead zones.



SUMMARY

The Whakatāne District Council is required by law (key statutes include the Local Government Act 2002, the Resource Management Act 1991, the Building Act 2004 and the Civil Defence Emergency Management Act) to manage hazards within its territorial boundaries.

There is evidence of debris flows having occurred at Matatā prior to the major 2005 event, but the magnitude and number of those events is unknown. An event of a similar scale to the 2005 debris flows is believed to have a return period of between 200 and 500 years. Although the topography of the lowlands area is relatively flat, debris fans have extended out a considerable distance from the base of the escarpment.

The main forms of slope instability observed on the Matatā Escarpment during the significant rainfall events of 2005 and 2010-2011 were debris avalanches originating on steep slopes, gullies and cliff faces. Despite the number of landslides generated during this period, no damage is known to have occurred as a direct result of landslide impact. T&T has no records of any claims being made to the Earthquake Commission (EQC) for property or land damage as a result of any landslides originating from the Matatā Escarpment. This compares to the more than 150 claims for landslide damage to properties near the Whakatāne and Ōhope escarpments between 2004 and 2012.

Photographs from the early to mid-20th century show that the Matatā Escarpment was relatively well-vegetated and largely devoid of significant landslide scarring. Aerial photographs show that there were very few landslides on the escarpment, or the hills behind it, prior to the 2005 debris flow event. However, the presence of a significant talus (debris) slope at the base of the escarpment clearly illustrates that over the years, a significant quantity of material has fallen from the escarpment in the form of landslides.

A landslide inventory developed for the Matatā Escarpment shows that rainfall-triggered events are the dominant cause of instability. Seismic-shaking is potentially the largest source of landslides on the escarpment, although the triggering event would have a much longer return period than that applying to rain storms.

Through the process of developing the landslide inventory and mapping the extent of previous debris flows, a series of hazard maps have been developed that show the spatial distribution of landslide and debris flow hazards across the escarpment and flatlands of Matatā.

Estimates of loss of life risk and property loss risk for the different landslide and debris flow hazard zones indicate that the risks to some properties in Matatā range from moderate to very high. The resulting level of risk is higher than is commonly considered tolerable in many parts of the world.

The greatest instability-related risk to Matatā is considered to be from moderate to large debris flows rather than landslides on the escarpment. It is a certainty that debris flows will occur in the future (the 2005 event is thought to have a probable return period of between 200 and 500 years), with the Awatarariki and Waitepuru Streams providing the most likely sources.

Options for reducing debris flow hazards are limited. The bunding and re-contouring work carried out at the Waitepuru Stream escarpment exit-point has reduced the hazard that a debris flow of a similar or smaller scale to the 2005 event would represent for residents in that area, but the risk that a larger event would pose still remains. Many properties in the higher hazard zones are occupied, so realistically, hazard management needs to focus on reducing the level of risk to both people and property if a debris flow does occur.

Possible risk management measures and strategy options are covered in some detail on page 7. For landslides, these range from site-specific works which property owners could undertake through to non-structural measures such as education programmes; advice notices; warning systems; evacuation procedures; and development controls.

Options for reducing the risk associated with debris flows include appropriate planning restrictions; regular catchment inspections; an early warning system to alert people living in at-risk areas of the likelihood of unusually heavy rain; and self-evacuation procedures. It is unlikely to be economically practicable for the owners of developed or undeveloped properties in the higher hazard areas, and in particular the Awatarariki Stream fanhead zone, to be able to reduce the loss of life risk associated with living on their properties to an acceptable level. The Council and the community will therefore need to work together to develop an acceptable, long-term solution.

Analysis of the hazard maps indicates that there are 82 properties in high hazard areas (62 of which are privately owned); 84 properties in moderate hazard areas (78 of which are privately owned); and 263 properties in low hazard areas (228 of which are privately owned). Note that the hazard map area extends beyond the town's urban boundaries.

The covering letter you received with this summary document tells you what hazard assessment applies to your property. The hazard assessment is for broad planning purposes and is not property-specific. For example, if you intend to carry out development on your property, a site-specific assessment will be required to confirm that hazard ratings take local factors into consideration.

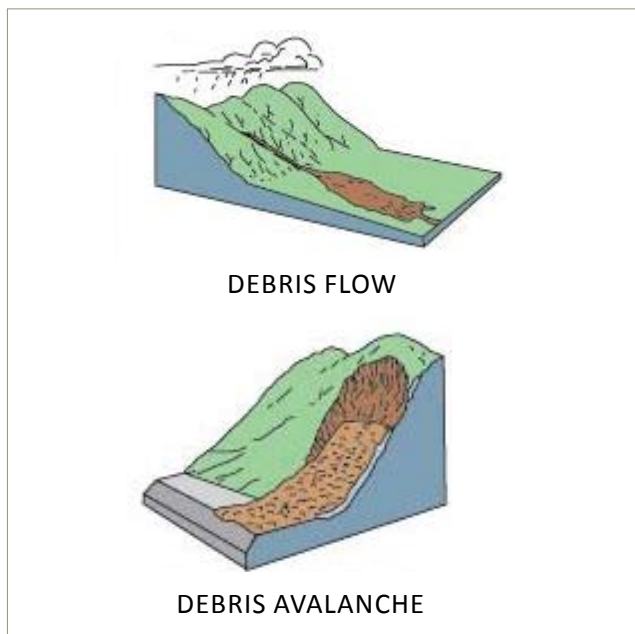
GEOLOGY AND DEBRIS FLOW/LANDSLIDE FORMATION

The hills to the south of Matatā are formed from inter-bedded alluvial, estuarine and marine deposits, interspersed with volcanic air-fall deposits.

Steep terrain and the relatively weak nature of the area's geology make the escarpment and the incised stream catchments susceptible to landslides and, in extreme weather events, the catchments are also susceptible to debris flow generation.

Landslides occur in many different forms. Those that have been observed in Matatā are:

- Debris avalanches from the escarpment face; and
- Debris flows.



Geology and topography are the primary factors contributing to slope instability, but there is usually a triggering event which initiates a landslide. Local experience indicates a close association between extreme rainfall events and landslides. Large earthquakes can also be a triggering event for landslides (but not debris flows), but the long return period between such events makes seismic shaking a less relevant factor.

Debris Flows

Although debris flows are one of the major forms of landsliding, the way they are transported and deposit debris differs from other landslide types to a such degree that the hazard and risk they pose needs to be considered separately. Unusually high rainfall is required to generate debris flows and if such an event follows an extended wet period, when the ground is already saturated, the likelihood of a debris flow increases.

The 2005 debris flows were triggered by some of the highest intensity rainfall events ever recorded in New

Zealand. Measured at the Awakaponga rain gauge, these included:

- 15-minute rainfall of 30.5mm
- One-hour rainfall of 95.5mm
- 24-hour rainfall of 302mm

A rainfall event of that intensity is estimated to have a return period of between 200 and 500 years. There is anecdotal and geological evidence of debris flows having occurred at Matatā prior to 2005, but the magnitude and frequency of those events is unknown. Those flows have extended a considerable distance from the base of the escarpment and have contributed to the formation of the flatlands on which Matatā has been built.

The 2005 debris flow from the Awatarariki Stream is estimated to have deposited at least 300,000 cubic metres of debris on the fanhead zone, while the debris flow from the Waiteperu Stream is estimated at 100,000 cubic metres.

Landslides

The Matatā Escarpment is geologically similar to the Ōhope Escarpment and, over time, is therefore expected to have a similar propensity for landsliding. That propensity is cyclical in nature, with soil and vegetation cover building-up on the face of an escarpment until heavy rain, or earthquake activity, de-stabilises an area to a point where it detaches from the slope.

Photographic records indicate little landslide activity on either the Matatā Escarpment or the hills behind it before the extreme rainfall event of 2005. That event caused a significant number of landslides, with further instances generated by heavy rainfall events in 2010 and 2011. To date, landslide activity has largely been confined to the escarpment west of the Awatarariki Stream and the hills forming the catchments of the area's streams. Most of the landslides which have occurred on the escarpment behind the township have been located between the Awatarariki Stream and Clarke Street. South of Clarke Street, the escarpment is lower in height and gradient, with fewer and smaller landslides occurring.

The record of landslides from the Ōhope Escarpment indicates that landslide probability increases significantly when daily rainfall totals exceed 100mm; and that during long wet periods, landslides occur at increasingly lower daily rainfall totals.

Seismic-induced Landslides

Earthquakes of a scale (equivalent to or greater than the 1987 Edgecumbe Earthquake) required to induce significant landslide activity on the Matatā Escarpment are estimated to have a return period of 150 years or longer.

SUSCEPTIBILITY, HAZARDS AND RISK ASSESSMENT

Susceptibility

Landslide susceptibility is an assessment of the likelihood that a particular area will generate, or be affected (inundated) by a landslide event. That assessment is based on a complex range of measures, but the key underlying assumptions are that: areas that have experienced landslides in the past are likely to be affected in the future; and that other areas with similar topography (slope angle) and geology are also likely to be affected.

That susceptibility analysis indicates that:

- The north-facing coastal cliffs to the west of the Awatarariki Stream are highly susceptible to landslides;
- Although fewer landslides have occurred on the escarpment behind Matatā, its geology and topography indicate that it is also susceptible to landslides. It is also susceptible to seismic-induced landslides;
- The escarpment south of Division Street is moderately susceptible to landslides; and
- Despite the long return period applying to debris flows, they represent a significant hazard particularly at the Awatarariki Stream, where no mitigation works are feasible.

Hazard Assessment

Hazard assessments are similar to susceptibility, but include an analysis of the estimated frequency of landslide events. Based on the number of landslides observed from photographic records, and based on experience at the Ōhope Escarpment, the Matatā Escarpment to the west of the Awatarariki Stream and between the Awatarariki Stream and Division Street are both assessed to have a high hazard rating, while the escarpment south of Division Street has a moderate hazard rating.

Hazard mapping has taken into account the estimated number of landslides per square kilometre per year (based on the inventory); slope angle; landslide initiation and inundation susceptibility; the likely run-out distance a landslide may travel; and any significant physical barriers, such as the railway embankment. Hazard maps will be available for inspection on the Council website (www.whakatane.govt.nz) from Friday 12 July, or upon request.

Debris flow mapping has been undertaken based on the known parameters of the 2005 event and then modelled for similar, smaller and larger events. That modelling takes into account the likely benefits of the diversion berms and re-contouring undertaken at the Waitepuru Stream.

EVENT RELATIVE MAGNITUDE	RETURN PERIOD (YEARS)	PROBABILITY OF OCCURRENCE IN 50 YEARS (%)	DESCRIPTION OF LIKELIHOOD IN 50 YEARS	HAZARD RATING
Half 2005	<200	>25	Likely	High
2005	200 - 500	10 – 25	Possible	Moderate
Twice 2005	>>500	<<25	Unlikely	Low

Notes: The design return period of the 2005 event has been estimated as being somewhere in the order of 200 to 500 years. For the purposes of this assessment, it has been assumed that an event that has half the volume of the 2005 event would have a return period less than this (say less than 200 years) but no value has been assumed. It has been assumed that given the very large size of the 2005 event, a future event that is twice this size would be a very rare event, if indeed it is even possible. The return period is unspecified but is assumed to be much greater than 500 years.

Risk Assessment

Risk assessments are based on both the hazard (likelihood) and the consequence of an event. That means that even if a hazard is not considered to be highly likely, if the consequences of it occurring are life-threatening, the risk to people exposed to the hazard is likely to be unacceptably high.

New Zealand does not have a formal system for analysing landslide risk and there are no established criteria for

determining risk tolerability and acceptance. Work in this area generally follows the AGS methodology for calculating loss of life risk (annual individual fatality risk). That risk calculation includes a number of variables, with the primary factors being the annual probability of landslide occurrence; the probability that a landslide will reach areas where people live or work; and the vulnerability of those people to an impact.

AGS defines an 'intolerable' loss of life risk to be any natural hazard risk with an annual probability greater than

one-in-10,000 (0.001 percent). The table below shows the assessed Loss of Life Risk associated with landslides from the Matatā Escarpment and debris flows. These risks are significantly higher than would be generally accepted in

many parts of the world. For comparative purposes, the following graph shows the average individual fatality risk New Zealand residents are exposed to from a range of hazards and other causes.

Estimated Annual Loss-of-Life Calculations

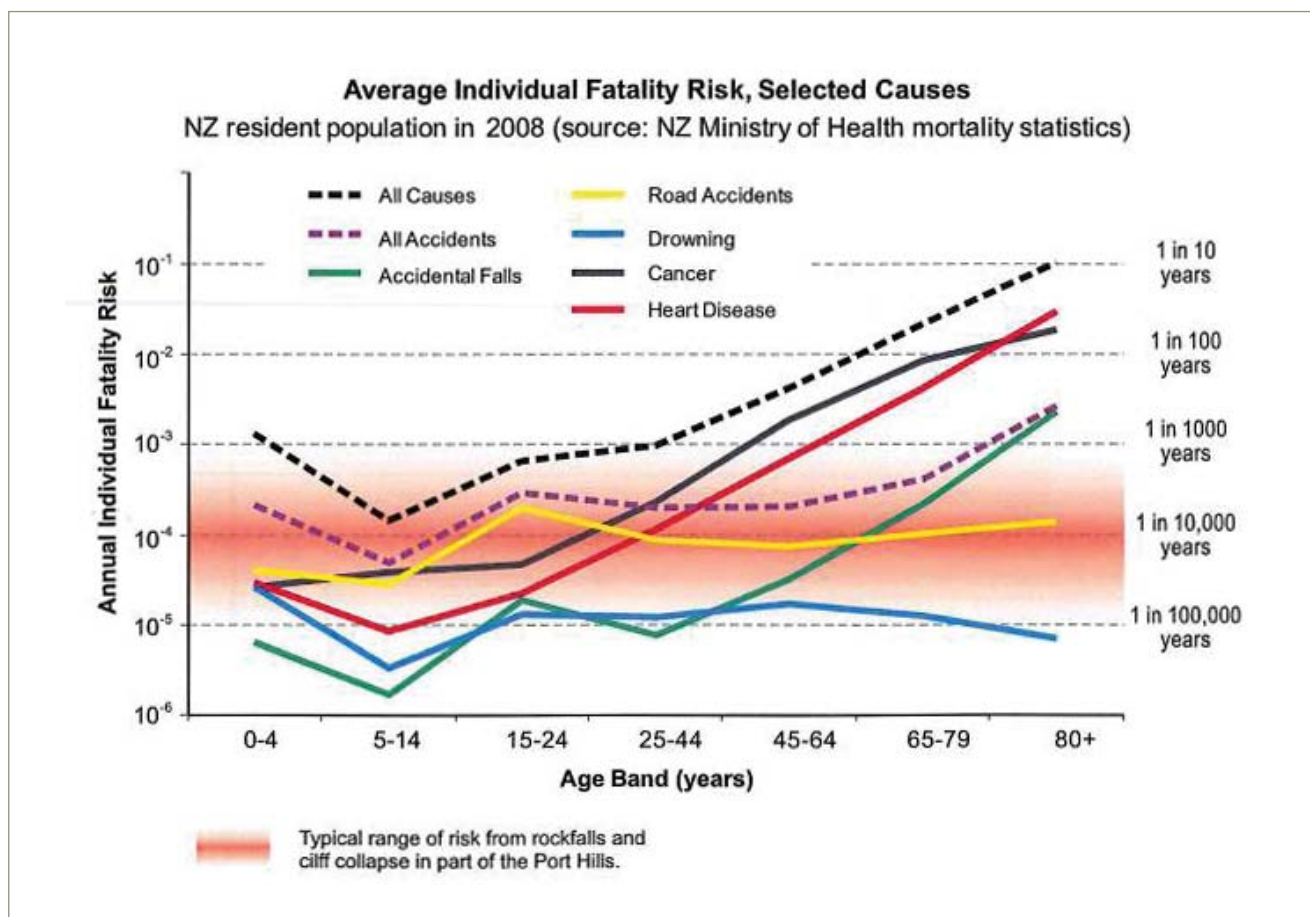
LANDSLIDES	HAZARD RATING	ANNUAL RISK ¹	AGS CLASSIFICATION ²
West of Awatarariki Stream	High-Moderate	N/A ³	N/A ³
Awatarariki Stream to Division Street	High	0.2%	Very High
South of Division Street	Moderate	0.034%	High
South of Division Street	Moderate	0.014%	High
Debris Flows			
Lower range of 2005 event	200-year return	0.1%	High-Very High
Upper range of 2005 event	500-year return	0.05%	High

Note:

¹ The annual probability of loss of life for a person most at risk (applies to people who spend most of their time at home and who live in a high hazard area)

² AGS considers any risk greater than 1-in-100,000 (0.001%) is above acceptable limits

³ As there are no homes in the inundation zone, the loss-of-life risk does not apply.



POSSIBLE RISK MANAGEMENT OPTIONS

Regardless of any value judgement Council and the community may come to about the tolerability of landslide risks, it is clear that the loss-of-life risk faced by people who live in close proximity to the Matatā Escarpment is greater than the level which is considered tolerable in many jurisdictions (including the Port Hills in Christchurch). The risk associated with debris flows is more problematic, given the theoretically long return periods which apply to these events, but it too is above the level considered tolerable.

The Council has a statutory responsibility to manage the risks associated with natural hazards. The following chapters set out a range of possible measures and strategies, which, over time, could reduce the risks posed by landslides.

Structural Measures

Hazard Elimination – Escarpment Landslides

Other possible measures which could be feasible, on at least a site-specific basis, include:

- Construction of earthwork buttresses to support the slope;
- Construction of retaining walls;
- Slope reinforcement; and
- Using netting or other similar solutions to prevent material falling from the escarpments from reaching dwellings.

The cost of some structural approaches, such as re-profiling or reducing the height of slopes, makes such measures impracticable.

Hazard Reduction – Escarpment Landslides

Possible hazard reduction measures include:

- Diverting stormwater flows away from landslide prone areas;
- Lowering groundwater levels through subsurface drains;
- Removing, or reducing the canopy weight of dangerous overhanging trees;
- Planting appropriate species to stabilise slope faces and bases.

Vegetation has been identified as a major component of destructive landslides elsewhere in the District. Vegetation control activities which would reduce the loss-of-life risk for the community are likely to be promoted as a priority.

Risk Reduction – Escarpment Landslides

Possible risk reduction measures include:

- Earth bunds;
- Steel posts (driven or sunk into the escarpment slope to catch sliding vegetation);

- Flexible net barriers;
- Impact walls; and
- Monitoring areas known to be unstable.

All of the above measures are feasible, at least on a site-specific basis. Any risk reduction work undertaken as part of a development (Resource and/or Building Consent) process would have to become a permanent commitment applying to future owners of the property or properties concerned.

Non-Structural Measures

Non-structural measures do not alter the likelihood of a landslide or debris flow occurring, but would be designed to reduce the possible consequences of an event. The Council will be looking to use a range of non-structural measures to ensure that: landslide and debris flow hazard levels are clearly understood by present and future owners; that there is no new development in areas where the risk to people's lives is unacceptably high; and encourage property owners to put risk reduction measures in place, where possible.

Information

Information initiatives include:

- Developing information resources to inform future decision-making;
- Contingency and emergency response plans;
- Education programmes to promote hazard and risk awareness;
- Advice and advocacy; and
- Using Land and Project Information Memoranda (LIMs & PIMs) to ensure knowledge of known landslide and debris flow hazards is permanently captured.

Warning Systems

Possible warning systems which could be implemented include:

- Landowner education on warning signs and the need for self-evacuation preparedness;
- Regular monitoring and assessment of escarpment slopes and stream catchments;
- Monitoring of MetService heavy rainfall warnings and rain radar data;
- Forwarding severe weather warnings to property owners via email, text or land-line alert systems; and
- Installation of sensors to measure land movement in high-hazard areas.

While severe weather warnings could help to reduce loss of life risks, any decision about whether or not to evacuate must always remain with property owners (unless a state

of emergency has been declared). History tells us that most heavy rainfall warnings are not accompanied by landslides, which in any event, will be random in nature and will not affect most properties. There is therefore a likelihood that warnings would increasingly be ignored if they are issued and no landslide eventuates.

In the case of escarpment landslides, warnings are likely to be dependent on actual daily rainfall exceeding 100mm, or heavy falls occurring after an extended wet weather period. It should also be noted that landslides could occur without a triggering heavy rainfall event. Initiation of a debris flow is likely to involve a considerably more severe rainfall event, with very heavy falls occurring over an extended period of time. Rain radar data will provide a useful guide, but again people on the spot will have the best evidence on which to base a self-evacuation decision.

Development Control

Possible development controls could include:

- Restrictive District Plan zoning and rules to control new development in high hazard areas, such as requiring resource consents for new dwellings, prohibiting new dwellings on hazard-prone sites, not allowing further subdivision, and not allowing new, vulnerable land uses to be established;
- Enabling District Plan zoning and rules to control development in hazard areas, such as: allowing existing activities to continue within existing housing envelopes; allowing alterations or re-development where the risk has been reduced to an acceptable level; allowing properly designed protection works to be undertaken without a resource consent; and providing best practice guidelines to help land owners mitigate the risk to their properties; and
- Regional Plan zoning and rules to control development in hazard areas (this aspect will be part of a separate study by the Bay of Plenty Regional Council). For some properties, this could involve measures such as requiring existing activities to cease by a specified date unless a resource consent is obtained, which would require the landslide risk to have been reduced to an acceptable level, or prohibiting redevelopment if a landslide or debris flow damaged or destroyed an existing dwelling.
- Changes to District and Regional Plans will be needed to implement these measures. The Council wishes to get feedback from the community to assist it in deciding which measures should apply.

CURRENT RISK MANAGEMENT STRATEGIES

The Whakatāne District Council's Operative and Proposed District Plans must give effect to the relevant provisions of the Bay of Plenty Regional Council's Operative and Proposed Regional Policy Statements. The Proposed Regional Policy Statement (RPS) includes a number of rules which are relevant to the landslide and debris flow hazard situation.

In summary, the RPS provisions require that:

- Natural hazard risks to human health and safety must be assessed as to whether they are acceptable, tolerable or intolerable;
 - That the community be informed about the level of risk and have an opportunity to respond;
 - That new development should be managed to ensure that natural hazard risks do not exceed acceptable levels;
 - That action is taken to make the level of risk in areas of existing use and development as low as reasonably practicable, until acceptable levels of risk are achieved;
 - That intolerable risks from natural hazards are avoided; and
 - That action to reduce natural hazard risks should be facilitated.
- The Whakatāne District Council Operative District Plan sets out objectives and policies which aim to provide protection from natural hazards (Objective NHaz1). Those which apply to rainfall-induced landslide hazards include:
- To avoid, or mitigate the adverse effects of subdivision, use, or development of land which is likely to be subject to material damage by erosion, falling debris, subsidence, slippage or inundation from any source (Policy 3);
 - To avoid or mitigate the adverse effects of subdivision, use, or development of land which is likely to accelerate, worsen or result in material damage to that, or other land or structures, from erosion, falling debris, subsidence, slippage or inundation from any source (Policy 4);
 - New structures shall not be sited, designed or constructed which would have an adverse effect on the stability of escarpments (Policy 7);
 - To manage vegetation and earthworks on escarpments to assist in stabilising the slope (Policy 8).
- The District Plan Planning Maps include maps defining the areas subject to hazards from falling debris from escarpments (NHaz4). These hazard areas are defined by a slope limit.

CONCLUSIONS

The hazard and risk assessment work undertaken by T&T makes it clear that there is an unacceptable loss-of-life risk associated with a number of properties located in close proximity to the Matatā escarpment, and also for properties in areas susceptible to debris flows. The hazard associated with debris flows from the Waitepuru Stream has been mitigated by bunding and re-contouring work designed to deflect future flows away from the urban area. However, an ‘over-design’ debris flow event hazard would still represent a significant hazard for anyone living in the potential flow path.

The Council has a statutory responsibility to take action to avoid or mitigate those hazards so that, over time, the risk to people is reduced to a tolerable, and ultimately, an acceptable level. That responsibility is likely to be given further weight by the provisions of the Bay of Plenty Regional Council’s Proposed Regional Policy Statement (currently under appeal).

Key matters for property owners to consider are:

- In the short to medium-term, existing property uses will not be affected (unless the risk to occupants is considered extreme);
- Planning rules are likely to be introduced in the Proposed Whakatāne District Plan which would prevent new development, or alterations to existing buildings in high and moderate landslide and debris flow hazard zones, unless work has been undertaken to reduce the level of risk to people living on the properties concerned;
- The Proposed Regional Policy Statement may, in future, introduce rules requiring property owners to

undertake hazard mitigation work within a specific timeframe;

- Any work undertaken to reduce the level of risk on one property must not increase the risk for neighbouring properties;
- It is intended that as a result of the community consultation process, a range of practical actions will be defined which will allow property owners and the Council to reduce the loss-of-life risk to people living in close proximity to the Matatā Escarpment. These may include escarpment slope stability monitoring (with particular emphasis on the effect that large trees may have on landslide initiation), warning systems, self-evacuation procedures, stormwater improvement works; and providing advice on possible hazard reduction works.

Although it may be technically possible to construct a dwelling which would achieve an acceptable level of risk, in terms of resisting debris flows, Council believes that it is unlikely to be economically feasible for any new development to proceed in high hazard areas, such as the Awatarariki Stream fanhead area. As indicated above, existing dwellings in those areas will not be affected by any of the District Plan options under consideration, but it is possible that the Regional Council may introduce new rules requiring hazard mitigation in such circumstances.

Given that more than eight years have elapsed since the May 2005 debris flows, the Council believes it is important that an appropriate resolution is achieved which will allow the owners of undevelopable property in the debris flow fanhead zones to reach a final resolution on the future of their properties.

COMMUNITY CONSULTATION

The Council is keen to facilitate opportunities for affected property owners, and other stakeholders, to seek further information and provide feedback on the community’s preferred options for addressing the unacceptable risk levels currently applying to many properties. Those opportunities could include neighbourhood meetings; face-to-face meetings with individuals or groups, or community-wide information forums. The covering letter which accompanied this summary includes details on how to record your preferred consultation option.

Property owners are encouraged to provide feedback for the Council to consider before new hazard zones

and planning rules are formulated as a variation to the Proposed Whakatāne District Plan. Any new zones or rules proposed will be subject to a formal consultation process, providing an opportunity for affected property owners to have their issues considered by the Council before the District Plan takes effect. Any appeals to the Proposed District Plan will be heard by the Environment Court.

The table below indicates the likely timeframe for the variation process.

TIMETABLE – PROPOSED WHAKATĀNE DISTRICT PLAN VARIATION: LANDSLIDES		
	Activities	Dates
1	Consult with communities on landslide issues and options paper	July 2013 – 30 September 2013
2	Prepare a variation (change) to the Proposed District Plan to manage landslide and debris flows, taking into consideration feedback	October 2013
3	Council approval and notification of variation to the Proposed District Plan: Submissions requested	November 2013
4	Submission period	December 2013 – January 2014
5	Public notification of availability of summary of requested decisions	February 2014
6	Further submission period	March – April 2014
7	Hearings, deliberations and decisions process aligned to Proposed District Plan Review	



QUESTIONS AND ANSWERS

LANDSLIDE HAZARDS

Q. If I live at the base of the escarpment and want to get a building consent for an alteration to my house, what difference will it make to my plans?

A. For buildings in high landslide risk areas, building consents would not be issued unless the project included measures designed to reduce the risk landslides represent to the current and future occupiers of your property.

Q. How will the outcomes of this study affect my insurance?

A. Household insurance policies may already have factored landslide hazards into the cover provided. Property owners are advised to consult their insurers to clarify their individual circumstances.

Q. If I already have a section 72 notice on my property, why is my property affected by the study?

A. The new hazard maps and proposed planning rules are likely to apply to all properties which are considered to be subject to high or moderate landslide hazards.

Q. Do I have to put in protection measures such as a retaining wall now?

A. No, but the Council is encouraging the owners of all properties in the landslide hazard areas to take advice about possible protection measures and where there are practicable solutions to landslide risks, to take action as soon as possible. Note that the Bay of Plenty Regional Council's Proposed Regional Policy Statement may, in future, impose a timeframe for risk reduction.

Q. What will happen with empty sections?

A. Any development on empty sections would be subject to resource and building consents. In high and moderate landslide hazard areas, those consents would not be issued unless approved risk reduction measures have been put in place to reduce the landslide risk to future occupants.

Q. Will the Council, or the Government, compensate me for any effect on my property value, or buy me out if there's no way to reduce the landslide risk to an acceptable level?

A. Compensation is unlikely. At this stage, no decision has been made on a policy relating to properties which are deemed to be uninhabitable because the landslide risk cannot be mitigated.

Q. Will the outcomes of this study be recorded on my property's LIM?

A. Yes. All properties in the landslide hazard areas will have information recorded on property information memoranda. Council is required by law to include any hazard information it has knowledge of.

Q. Will everyone in the landslide hazard areas have to apply for a resource or building consent to put in a protection structure such as a retaining wall?

A. The planning rules proposed to help manage the landslide hazard would make approved protection structures a permitted activity. As such, this would not require a resource consent, but a building consent may be needed.

Q. There is another house between mine and the escarpment which will protect us from landslides, so why is my property included in the hazard area?

A. Individual property circumstances will be assessed, but it's unlikely that the presence of another structure will provide full protection against landslides.

Q. Can I make the owner of the property behind mine put in a protection structure to make my house safe too?

A. No. Council would encourage the owners of neighbouring properties to look at a shared approach to protection structures to ensure that everyone gets the best possible safety outcome at the lowest possible cost.

Q. I already have a protection structure with a consent from the Council, so can my property be removed from the hazard maps?

A. That information will be recorded on your property information memoranda and taken into account if you seek a building or resource consent in the future. It would also be taken into account by anyone looking at purchasing your property in the future.

Q. If I put in a protection structure, will I be able to subdivide or build a new house?

A. The planning options under consideration may prevent new development in the hazard areas. A resource consent for subdivision or a new building would only be provided if protection measures have been put in place to reduce the risk associated with landslides to an acceptable level.

Q. My property is flat and away from the escarpment, why is it included in the hazard area?

A. The hazard maps take into account the possible run-out distance landslides could travel from the escarpment. Properties located further away from the base of an escarpment will generally have a lower hazard assessment level and that will be reflected in property information memoranda.

Q. If large trees on the escarpment are dangerous, why are they being protected under the Proposed District Plan?

A. The escarpment is undoubtedly a significant landscape feature which should be protected. However, if large trees are assessed to be increasing the level of risk to people and properties, action will be taken to address that issue.

Q. How does this situation compare with the Port Hills in Christchurch?

A. The situation and the proposed resolutions are very similar, although in the Port Hills case, the cause of instability is seismic rather than heavy rainfall events. Central government is involved in the reduction of risk in the Port Hills area.

Q. Why consider such long-term risks when the Building Act assumes that houses will last for 50 years or less?

A. People will continue to live in the areas included in the landslide hazard maps far into the future. The Council is taking action now to ensure that, over time, the risk to people and property is reduced to a level which the community is happy with and which meets our legal requirements. We are looking to achieve long-term solutions which will safeguard today's and tomorrow's residents.

DEBRIS FLOWS

Q. It's more than eight years since the debris flow disaster and I still can't do anything with my section. When is this situation going to be finally resolved?

A. The new planning rules likely to be introduced as a variation to the Proposed District Plan would not allow the construction of new dwellings in areas subject to high and moderate debris flow hazards as the risk are considered to be too high. Other uses may be possible, but would be subject to resource and/or building consent requirements.

Q. If I can't build on my land, is the Council going to buy it?

A. Council's legal advice indicates that there is no legal requirement to purchase such properties. However, no policy decision has been made about property acquisition

and this is one of the many matters that Council elected members will have to consider in the future.

Q. If I'm prepared to take the risk of living on my section, why can't I go ahead and build?

A. The laws governing Local Government require the Council to take action to prevent development in areas known to be subject to significant natural hazards and we now know that debris flows present a very high risk to the lives of anyone living in their path. While major debris flows may have long **probable** return periods of 200 years or more, an event of a similar scale to the 2005 debris flows could happen at any time.

Q. Will the existing houses in high debris flow hazard areas be allowed to remain?

A. Existing uses would be allowed to continue within the same 'footprint'. These rights are formally protected under the Resource Management Act. Housing extensions or other new structures would probably not be allowed, unless they were designed to reduce the level of risk from future debris flows.

Q. The hazard map shows there is still a debris flow hazard area at the Waitepuru Stream. Does that mean the works undertaken there have not been effective?

A. No. The bunding structure and re-contouring work at the Waitepuru have substantially reduced the area that would be affected by a debris flow of similar or smaller size to the 2005 event. A larger event would still represent a hazard, however.

Q. Is the Council going to do anything to protect the homes in the Awatarariki debris flow hazard area?

A. We now know that there is no practicable engineering solution to prevent debris flows from the Awatarariki reaching the urban area. As part of the non-structural actions planned to reduce the level of risk to residents in that area, we will be looking to introduce a warning system based on catchment monitoring, MetService severe weather advice and rain radar information. However, people living in the fanhead area will still need to use their own judgement, based on the weather conditions they are experiencing, about the need for self-evacuation.

Q. What is the Council planning to do to clean up the mess that still remains at Clem Elliot Drive after the 2005 event?

A. Any cleanup works in this area need resource consents because of the volume of material that needs to be moved. The Environment Court has previously refused consent for this because they felt that that the works could have an adverse impact on Koiwi (human remains). The Court also had concerns about the works having no clear hazard mitigation benefit and of enabling construction in an area at risk of future debris flows. The Council will consider any ideas the community has for a cost effective solution.

Q. Why wasn't this risk assessment done after 2005 debris flows?

A. In the aftermath to the 2005 event, the Council, and the Government, believed that it would be possible to put engineering works in place to prevent or at least greatly reduce debris flow hazards. All of our efforts were therefore directed towards achieving that goal. While that has been achieved at the Waitepuru Stream, no practicable and economically feasible solution could be found for the Awatarariki Stream.

*MANAGING DEBRIS FLOW
AND LANDSLIDE HAZARDS*



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