



WHAREKAWA COAST 2120

Natural hazard risk assessment – community risk thresholds

Sub-compartment 2B (Kaiaua inland)



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Overview



What is the Wharekawa Coast 2120 project?

Wharekawa Coast 2120 is a joint council, iwi and community-led project that looks at a range of issues and how we can provide for a resilient and prosperous future over the next 100 years.

Natural hazard risk is a particular concern, and understanding and evaluating this risk is essential to planning a response. The end plan will be used to guide decision making for local planning purposes and to secure support for funding specific projects. The plan will need to be regularly reviewed and adapted as our understanding changes, and the progress will be an evolving and ongoing conversation.

To help achieve this plan, a community panel of local volunteers and a project governance group was set up. The panel, which meets once a month, works with communities, councils and iwi to make recommendations to the governance group (comprising iwi and Hauraki district, Waikato regional and Waikato district council representatives) on actions over the next 5, 10, 20, 50 and 100 years.

To work out the plan of action, the community panel needs to know what matters most to the members of the community. Figure 1 and 2 show the draft themes and goals identified by the community panel.

This is not just a five-minute chat. It will take a while and will require in-depth conversations. This natural hazard risk assessment is part of those conversations. The councils, which collated all their knowledge of hazards within the Wharekawa coastal region, have developed this risk assessment of coastal inundation and river flooding. We need you to tell us the level of risk you think the community is prepared to tolerate moving forward.

This is the first attempt at determining community risk thresholds. As more technical, scientific and personal information becomes available, there will be opportunities to refine the thresholds.

Throughout this booklet we have provided a space for personal comments. Please feel free to comment. Your opinions are important.

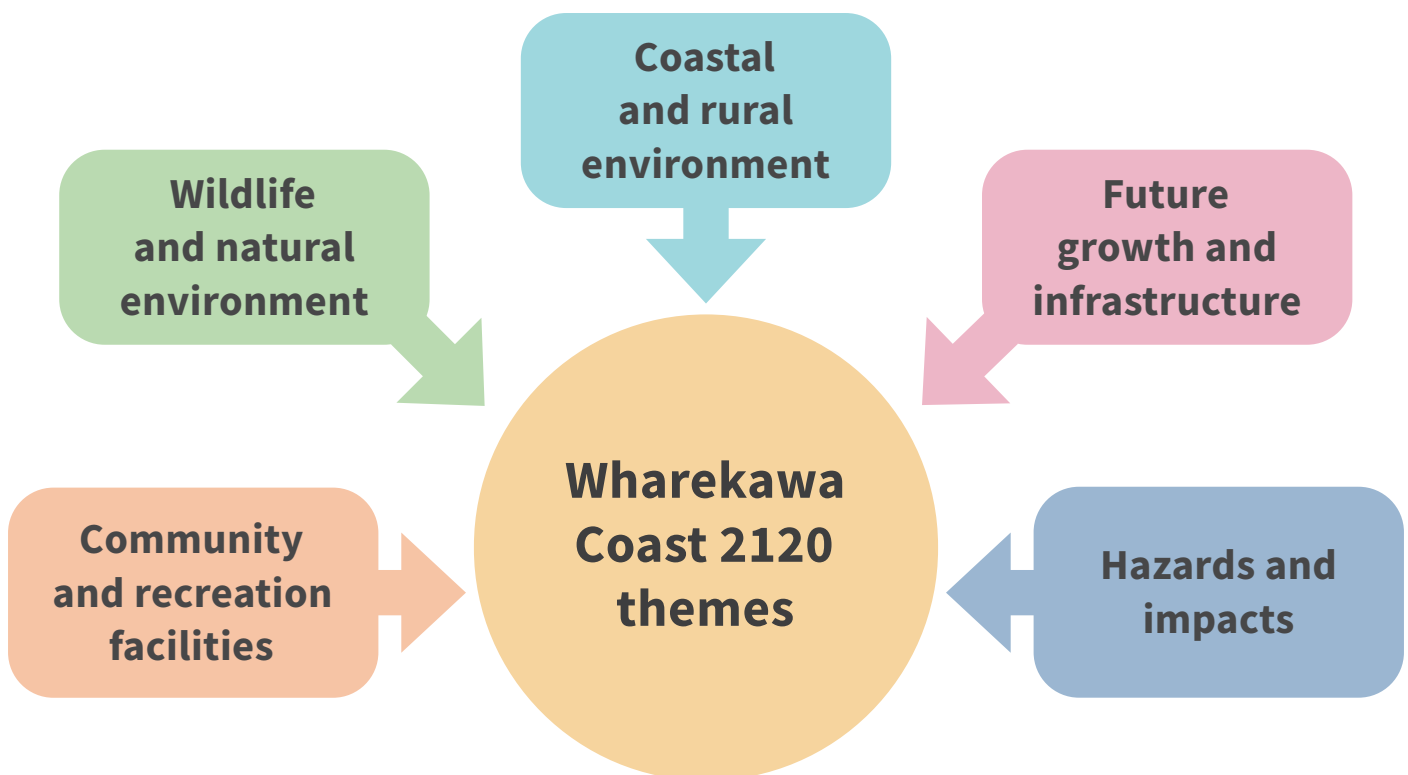


Figure 1: Wharekawa Coast 2120 key themes

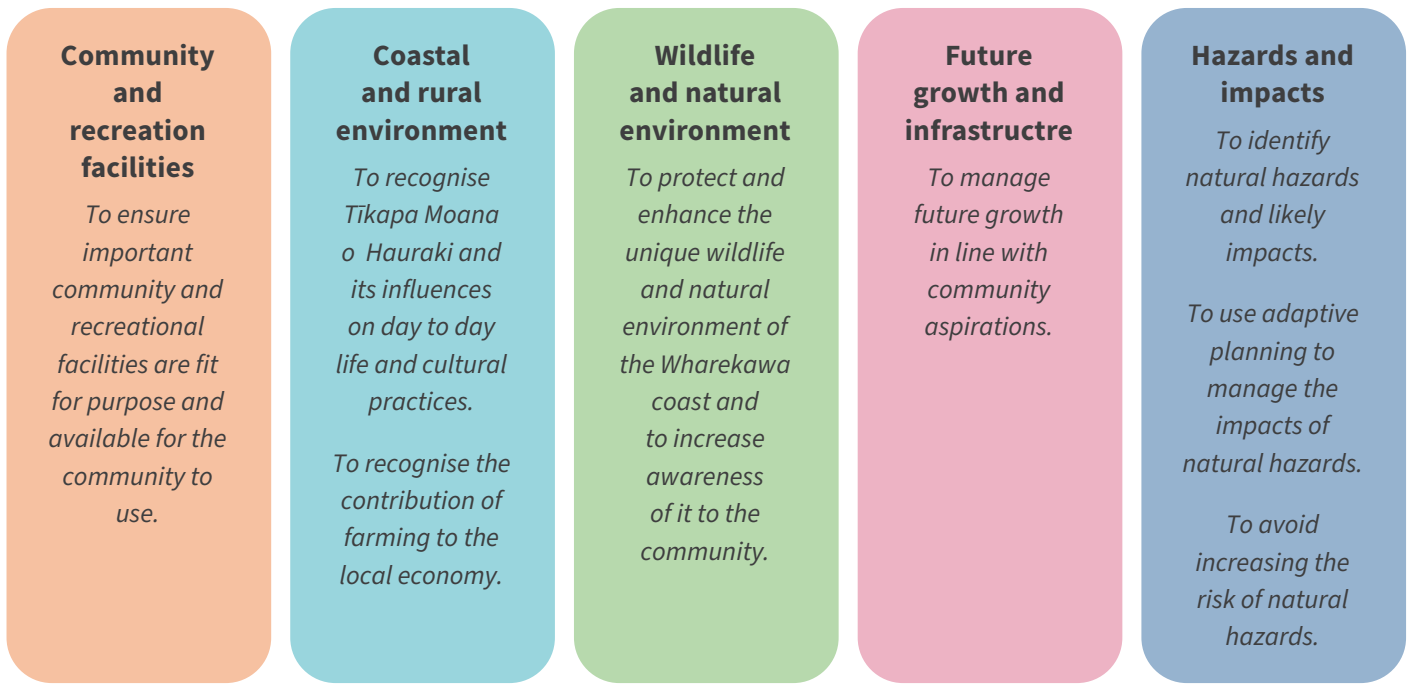


Figure 2: Wharekawa Coast 2120 goals

Write any comments here

Community risk thresholds exercise

The Wharekawa Coast has already experienced significant **coastal inundation** and freshwater flooding events, particularly from Huarahi Stream. With the projected effects of climate change, these events will become more frequent and more severe. To help plan for the future, we want to know when the community will no longer be able to **tolerate** the impacts from coastal inundation and Huarahi Stream flooding.

The information in this booklet is taken from the *Wharekawa Coast 2120 – Natural Hazard Risk Assessment*. The purpose of this **risk** assessment is to:

- work with and enable the community panel to understand the most significant **natural hazard** risks to the Wharekawa Coast 2120 project area
- enable the community to evaluate the risk posed by these hazards by determining initial **community risk thresholds** (thresholds) for the impacts of each hazard scenario
- compare the relative risk of these hazards across different **sub-compartments** and **impact categories** to inform the development of **adaptation actions and pathways**.

The information given in this booklet will help you assess your thresholds, and is provided as:

- project area information
- sub-compartment impact information.



Huarahi Stream.

The definition of each bolded term can be found in the glossary.

Project area impact information

This information comes from experts, community members and the impacts from recent coastal inundation and Huarahi Stream flooding events.

For some impact categories, the thresholds assessed by asset and emergency managers, determined during a workshop in September 2020, have been provided. These thresholds relate to what these managers can tolerate in terms of resources required for them to respond to natural hazard events. Beyond these thresholds, the level of service provided may reduce.

Sub-compartment impact information

This information comes from the results of **quantitative risk assessments** for both coastal inundation and Huarahi Stream flooding (as well as some impact information from recent events). Data is presented for:

- sub-compartments within the project area (see figure 4)
 - the project area has been divided into sub-compartments so that natural hazard risk, thresholds and adaptation actions can be assessed for each sub-compartment and so provide more useful outcomes
- natural hazard scenarios
 - two scenarios, a major and a moderate event (see figure 3), for both coastal inundation and Huarahi Stream flooding (the major coastal inundation event is approximately equivalent to the January 2018 storm tide event, and all scenarios can occur with the current climate and sea level)
- elements (e.g. buildings, roads, shops), divided into impact categories
 - homes, buildings and disruption to residents
 - rural land
 - roads and bridges
 - services
 - recreation and tourism
 - overall impacts.

What this information tells us

The natural hazard scenario models (figure 3) allowed us to assess the exposure of elements (e.g. buildings, roads, pasture) within the impact categories for moderate and major events. This tells us whether an element is within a flood area and how deep the flooding is expected to be.

We then estimated **damage costs** for buildings, roads and rural pasture land (based on numerical data available) and **resident displacement**. Assumptions have had to be made. For example, we do not know for sure what damage will occur, or what the characteristics of individual buildings are. However, the estimations are still useful, especially when comparing possible damage costs and resident displacement between the sub-compartments and hazard scenarios. Key assumptions and limitations are outlined in the appendix.

When reviewing the impact information, something to keep in mind is that the **vulnerability** of different people and elements is not the same. For example, some people may be more vulnerable due to age or disability, and some businesses may be more vulnerable due to a greater reliance on favourable weather or tourism income.

How the thresholds will be used

Once members of the community have assessed their thresholds, Waikato Regional Council staff will collate and analyse the results, and present them back to the community, via the community panel, to check they accurately represent the community's thresholds.

These thresholds will then be used, together with the thresholds determined by asset and emergency managers, to figure out how much time is available to implement adaptation actions to reduce the natural hazard risk to the community. They can also be used to prioritise sub-compartments and impact categories where the risk will need to be addressed sooner.

This is the first attempt to determine the community's risk thresholds. As more information becomes available (particularly when investigating adaptation actions), there will be opportunities to refine these thresholds.



Rural land.



Rural land.

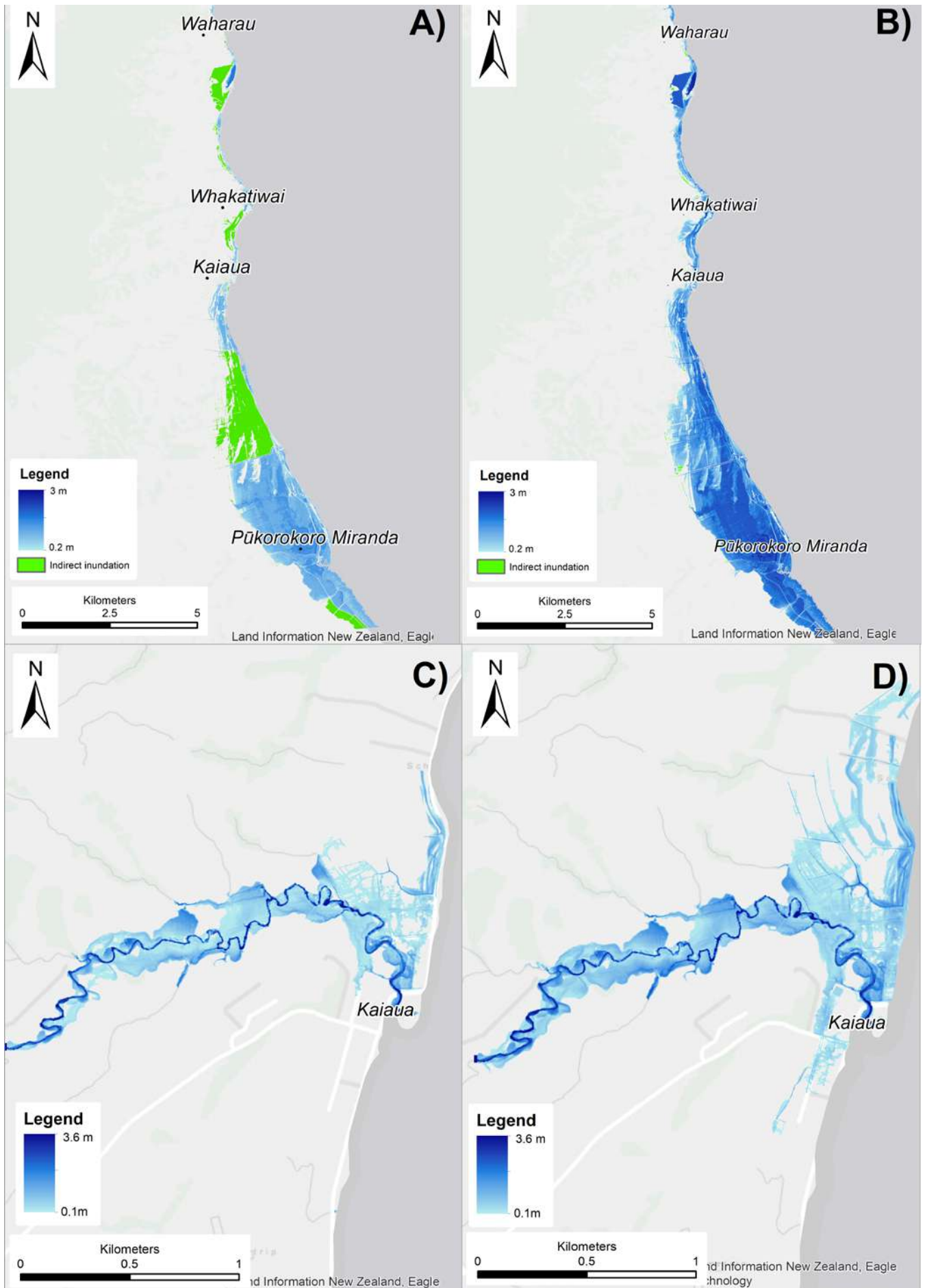


Figure 3: Natural hazard scenarios for the quantitative risk assessment: A) coastal inundation – moderate; B) coastal inundation – major; C) Haurahi Stream flooding – moderate; D) Haurahi Stream flooding – major

Instructions

This exercise contributes to finding out the community's risk thresholds for coastal inundation and Haurahi Stream flooding in the Wharekawa Coast 2120 project area. You will be assessing thresholds for sub-compartment 2B (Kaiaua inland).

We are asking community members to individually assess community risk thresholds for Haurahi Stream flooding in sub-compartment 2B (Kaiaua inland) (see figure 4). Thresholds will be assessed for both moderate and major events.

Community members should assess their thresholds from the perspective of the community in their sub-compartment, not as an individual. This is because the impact information is generally at the sub-compartment level of detail, rather than at individual property level, and because the results will inform a wider community strategy. The threshold is when you think your community in your sub-compartment will no longer be able to tolerate the impacts of an event.

Thresholds will be assessed for the following impact categories.

1. Rural land
2. Overall impacts

For this sub-compartment, the impact categories of homes and buildings (27 main buildings) and disruption to residents; roads (7km) and bridges (0); services; and recreation and tourism have been assessed. However, as they are either not exposed or not located within this sub-compartment, no thresholds are required.

Information on the expected impacts of each scenario is provided to help determine each threshold. Each impact category has information generally relevant to the whole Wharekawa Coast project area, and specific impact information for the relevant sub-compartment.

This is the first attempt at determining community risk thresholds. As more information becomes available, there will be opportunities to refine these thresholds.

Determining your thresholds

For each threshold:

1. Read and understand the accompanying impact information.
2. Use the method to the right and the tables provided to indicate when the impacts could no longer be tolerated (see figure 5).

Figure 5: Example of how to fill out the tables

ARP	200yr	100yr	75yr	50yr	20yr	10yr	5yr	2yr	1yr	6mth	2.4mth
Major event				X							
Moderate event								X			

If a threshold is not reached because the impacts are low, colour all squares green..

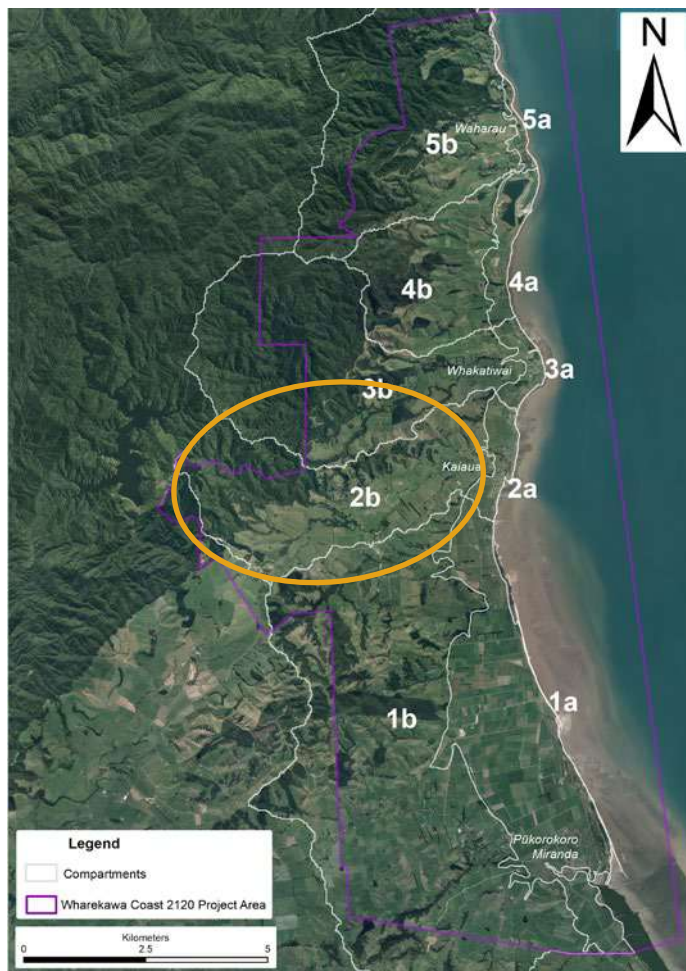


Figure 4: Wharekawa Coast 2120 project area and sub-compartments

3. On the table, your mark should be as far to the RIGHT as possible. This is the point at which you think the community truly could no longer tolerate the impacts. The moderate event should be further to the RIGHT than the major event, as we could typically tolerate a moderate event more often.

Method

- a) Start at the left-hand side of the table and ask yourself if the community could tolerate the impacts occurring every 200 years?
- b) If YES, colour the square green and then ask yourself the same question but for the next **ARP** (100 years, 75 years and so on) until you say NO.
- c) Once you can say NO, put an X in that square and colour it and all those to the right red. This is your threshold.

Hauarahi Stream flooding



Impacts to rural land

Project area impact information

Impacts may include:

- direct costs:
 - to re-establish pasture
 - expected to be minimal as most pasture will survive freshwater flooding, unless underwater for at least four days or there is considerable silt deposition (not expected for Haurahi Stream) (more detail in the appendix)
 - of spraying out paddocks or weeds and cultivation
 - to clear sediment and debris and repair infrastructure (e.g. fences) and equipment (e.g. milking machinery)
- loss of pasture productivity, resulting in:
 - additional feed requirements
 - relocation of or reducing stock numbers, etc
- reduced income for farm owner and/or loss of jobs or reduced income for employees.

With climate change, weather is likely to become more unpredictable. If farms are already under stress, for example from drought, this is likely to worsen any impacts from river flooding events.



Rural land surrounding Haurahi Stream along Toft Road.

Sub-compartment 2b (Kaiaua inland) impact information

What's here

- 1120ha of rural land

During a **major event**, it's estimated that:

- 22ha of rural land is exposed to flooding (2 per cent)
- the cost to re-establish pasture will be minimal.

Numbers and percentages presented may appear inconsistent because numbers have been rounded to reflect uncertainty and percentages are calculated using raw data.

Information regarding the key limitations and assumptions for pasture re-establishment cost can be found in the appendix.

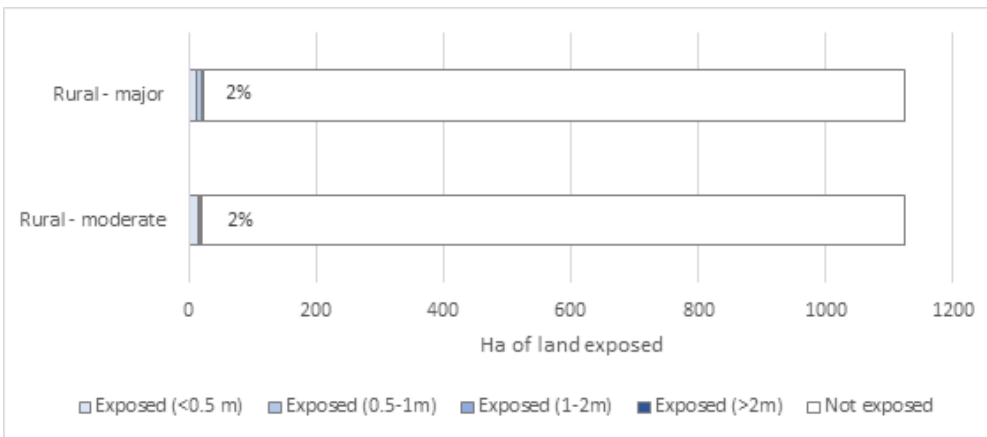
During a **moderate event**, it's estimated that:

- 19ha of rural land is exposed to flooding (2 per cent)
- the cost to re-establish pasture will be minimal.



Rural land around Workman Road.

Figure 6: Exposure of rural land during major and moderate events



Mark your community risk thresholds here

ARP	200yr	100yr	75yr	50yr	20yr	10yr	5yr	2yr	1yr	6mth	2.4mth
Major event											
Moderate event											

Write any comments here

Overall impacts

As there is only one set of thresholds (for rural land) in sub-compartment 2B, this will become your overall impacts threshold.

Mark your overall community risk thresholds here

ARP	200yr	100yr	75yr	50yr	20yr	10yr	5yr	2yr	1yr	6mth	2.4mth
Major event											
Moderate event											

Write any comments here



Rural properties and coastal view.

Appendix



Glossary

Adaptation actions and pathways

A response strategy to anticipate and cope with natural hazard impacts that cannot be (or are not) avoided under different scenarios of climate change. Can also be referred to as (natural hazard) mitigation measures.

Average return period (ARP)

How often a given size event is expected to happen on average, e.g. once every 100 years.

Coastal inundation

Flooding from the sea.

Community risk threshold

The point at which the community can no longer tolerate the impacts of a natural hazard event. Adaptation actions or pathways should be implemented prior to a community risk threshold being reached.

Damage cost

The estimated cost of damage to buildings, roads or rural pasture land due to damage from coastal inundation or Hauarahi Stream flooding.

Exposure

People, property, or other elements present in hazard zones that are therefore subject to potential loss.

Impact categories

Data on what is present in the project area (e.g. buildings, roads, shops, known here as elements) has been divided into categories to group similar elements together.

Natural hazard

A natural process or phenomenon that may cause loss of life, injury, other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage.

Quantitative risk assessment

The quantitative risk assessment uses numerical data and other information to numerically describe how things may be impacted from coastal inundation and Hauarahi Stream flooding events.

Resident displacement

The average time that residents are unable to live in their home while repairs are made to the building due to damage from a natural hazard event.

Risk

The effect of uncertainty on objectives. Risk is often expressed in terms of a combination of consequences of an event (including changes in circumstances) and the associated likelihood of occurrence.

Sub-compartments

The project area has been divided into five compartments, each with one coastal and one inland sub-compartment. This is so that natural hazard risk, thresholds and adaptation actions can be assessed for each sub-compartment and so provide more useful outcomes.

Tolerable

A range of risk that a community is able to endure to allow them to continue to receive the benefits of an area or situation. It is not something to ignore, but should be kept under review and mitigated if possible. When the risk is no longer tolerable (intolerable), it cannot be justified and risk reduction is essential.

Vulnerability

The predisposition to be adversely affected, or the lack of capacity to cope and adapt. Many characteristics can affect the vulnerability of a community, including social and economic characteristics, as well as characteristics caused by the location of communities, e.g. road access.

Key limitations and assumptions for damage cost estimates

Damage cost estimates are unlikely to represent actual repair/replacement/re-establishment costs following an event, however, they provide a means to estimate and compare these costs across the sub-compartments and for different hazard and event scenarios. Costs have only been estimated where fragility (physical vulnerability) and cost information is readily available.

Rural land

- Huarahi Stream flooding
 - Though it is recognised that pasture growth may be restricted in the short to medium term, the cost to re-establish pasture is expected to be minimal because:
 - following the Taranaki and Horizons regions storm in 2015 (freshwater flooding), most of the pasture on inundated farms remained alive as the water receded within six days
 - Dairy NZ states that in cold weather pasture can survive for 10-12 days in clean water and 4-10 days in silted water
 - floodwaters from the Huarahi Stream are expected to drain relatively quickly (the majority within four days), and are not expected to deposit large volumes of silt (according to modelling and historical event knowledge).

Write any comments here

He taiao mauriora

Healthy environment

He ōhanga pakari

Strong economy

He hapori hihiri

Vibrant communities

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Private Bag 3038
Waikato Mail Centre
Hamilton 3240
New Zealand

0800 800 401
waikatoregion.govt.nz

