Natural Hazards Commission Toka Tū Ake

Pre-event Land Use Planning Methodology

2025

Natural Hazards Commission Toka Tū Ake
Te Kāwanatanga o Aotearoa New Zealand Government

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Executive summary

Pre-event land use planning is a way to integrate land use recovery options into plans and strategies before a natural hazard event occurs. The goal of pre-event planning is to ensure that communities are better prepared to recover their land use activities quickly, safely, and sustainably after a natural hazard event.

Despite evidence that pre-event planning provides the time required to evaluate land use options and develop robust sustainable solutions, there is a lack of current guidelines or planning standards available for creating pre-event plans. Where pre-event plans do not exist, quick and often uninformed recovery decisions are made on limited information. Significant events such as the 2010-2011 Canterbury Earthquake Sequence, 2016 Kaikōura Earthquake and 2023 North Island Weather Events have highlighted the need for and importance of pre-event land use planning.

Aimed at councils and other stakeholders who are involved in land use recovery, the Natural Hazards Commission Toka Tū Ake (NHC) has developed this 'Pre-event Land Use Planning Methodology' to meet this gap. It has been designed to guide pre-event land use planning and should be used in conjunction with NHC's Risk Tolerance Methodology (summarised in Appendix 1). It addresses common land use planning issues during recovery, legislative mandates for pre-event planning, and the benefits of such planning for climate change adaptation and natural hazard risk reduction.

Seven steps make up the methodology:

1. Articulate and set the land use recovery objectives
2. Assess the current and future risks from natural hazards
3. Undertake a risk tolerance assessment
4. Assess planning options for land use recovery
5. Prepare the pre-event land use plan
6. Implement the pre-event land use plan
7. Sustain awareness of the plan and review

By embedding recovery-focused land use planning into existing frameworks before a disaster occurs, this methodology empowers councils and communities to make faster, more informed, and more resilient decisions when it matters most.

Introduction

Natural hazard events in Aotearoa New Zealand – such as the Canterbury Earthquake Sequence (2010–11), the Kaikōura Earthquake (2016), and the North Island Weather Events (2023) – have repeatedly exposed the challenges of making timely, informed land use decisions during recovery. These events have highlighted the need for a more proactive, structured approach to land use planning that anticipates recovery needs before a disaster occurs.

Pre-event land use planning integrates recovery options into land use policies, plans, and decisions before an event occurs. By planning ahead, councils and communities can reduce uncertainty, accelerate recovery, and make more sustainable, equitable, and resilient land use decisions in the aftermath of a disaster. It also helps to build agency-to-agency, and agency-to-community networks, which are beneficial in the recovery process.

Although the advantages of pre-event land use planning are well recognised[1], there is a lack of updated, consistent guidance or standards for undertaking pre-event land use planning in New Zealand. In response, the Natural Hazards Commission Toka Tū Ake (NHC) has developed this methodology to fill that gap. It provides a practical, step-by-step framework for councils and planning authorities to prepare for land use recovery, drawing on lessons from past events and the subsequent recovery, while aligning with national strategies for disaster risk reduction and climate adaptation.

This guidance identifies common challenges during recovery, and presents a seven-step methodology to support more effective planning. It is intended to be used alongside NHC's Risk Tolerance Methodology and other relevant planning tools to enable faster, more coordinated, and community-informed recovery outcomes.

1 For example Becker, Saunders & Kerr (2006) Pre-event recovery planning for land-use in New Zealand. GNS Science Report 2006/23, Wellington; and American Planning Association (2014) Planning for post-disaster recovery: next generation, APA Planning Advisory Service.

Common land use recovery issues

New Zealand has experienced significant natural hazard events, including the Canterbury Earthquake Sequence (2010-11), Kaikōura Earthquake (2016), and North Island Weather Events (2023), as well as numerous smaller scale events. Effective pre-event land use planning could have improved recovery outcomes from these events, including quicker policy responses and recovery times, and the opportunity to reduce future risks. Below are four common land use planning recovery issues that could be avoided with pre-event plans.

1. Categorising land use post-event

'Red stickering' (no entry due to high risk) and 'red zoning' (land unfeasible to be rebuilt on) have become prominent issues after significant events. These classifications often require property repairs or compensating owners to relocate[2], with assessment criteria taking months to develop. Following the September 2010 earthquake in Canterbury, many homes in Christchurch's eastern suburbs were rebuilt and repaired in vulnerable areas, leading to similar damage during the February 2011 earthquake. The 'red zoning' process faced many challenges, due in part to a lack of planning for legislative actions and relocation sites. Similar issues arose after the North Island Weather Events in 2023.

As a result of the time taken to categorise land use, community relocation is a slow and difficult process for decision-makers and affected communities. If not effectively implemented, it can have adverse impacts on communities. Other relocation processes in New Zealand following natural hazard events have also been challenging. The managed retreat process following the Matatā debris flow (in 2005) took 17 years to be finalised. An adaptable framework based on pre-determined criteria is essential to assist decision-makers post-event; for example, if properties should be 'red stickered', if mitigation works are needed, or if relocation is best.

2. Role of the Resource Management Act

New Zealand typically relies on Orders in Council to facilitate recovery from natural hazard events. Orders in Council allow for rapid regulatory changes to address issues, such as expediting a recovery process. However, that can be controversial as they override existing legislation, are not subject to the same level of scrutiny as other legislation and are often developed under time constraints. During the 2010-11 Canterbury Earthquake Sequence (CES), Orders in Council were used to accelerate processes for waste and debris management, land remediation work, and repairing the electricity network[3].

2 Planned relocation, also called managed retreat, is the process of moving communities, infrastructure, and sites of cultural significance away from areas threatened by natural hazards.

3 Canterbury Earthquake recovery Authority (2016c). List of Orders in Council 2010-2015. https://quakestudies.canterbury.ac.nz/store/object/524748

Following Cyclone Gabrielle, Orders in Council were created to address waste and debris on rural agricultural production land by allowing burning and to modify the Resource Management Act (RMA) to facilitate the construction of new landfills. The Resource Management (Consenting and Other Matters) Amendment Act addresses this by providing emergency response regulations for response and recovery (s331AA).

If an emergency is declared, regulations may be made to assist in the response to an event and enable recovery. This includes altering the status of land use activities, modifying unitary, regional, and district plan development processes, and temporarily halting the processing and granting of consents. Land use planning for, and testing of, these regulations could be assisted through the application of a pre-event land use planning methodology. Pre-event land use planning can complement the current hazard risk management system by improving how land use planning is approached in the context of recovery, contributing to resilient recovery outcomes for communities.

3. Lack of time for robust engagement

During recovery from an event, people are often struggling with their wellbeing, balancing professional and personal commitments, supporting loved ones, and feeling anxious about the many unknowns. New governance and legislative processes for the recovery may streamline ‘business as usual’ consultation opportunities, limiting how and when engagement can happen.

4. Protracted land use policy response

After a natural hazard event, an updated district plan is often needed for effective land use planning and investment. Standard RMA processes can take over 10 years to become operative. After the CES, it was clear the existing Christchurch City Council's City Plan was inadequate for recovery. An Order in Council streamlined the process, reducing it to three years. If legislation had required pre-event land use planning, the planning process could have responded faster to the event and there would have been more certainty about the process in advance of the event.

The Matatā debris flow in 2005 required 17 years of planning to remove existing use rights and rezone affected properties. Severe rainfall caused landslides, flooding, and a debris flow, destroying 27 homes and damaging 87 properties. A lengthy process involving risk assessments, mitigation options, voluntary property purchases, and plan changes could have been shortened with pre-planned adjustments to district and regional plans, such as a pre-agreed threshold for extinguishing existing use rights across the region.

A mandate for pre-event land use planning

New Zealand supports the 2015 Sendai Framework for Disaster Risk Reduction, which influenced the National Disaster Resilience Strategy. Priority 2 of the Sendai Framework aims to strengthen disaster risk governance, contributing by "enabling adaptable land use plans for faster recovery".

This Pre-Event Land Use Planning Methodology focuses on land use planning under the RMA, recognising that pre-event planning supports the Climate Change Response Act 2002, Local Government Act 2002, and Civil Defence Emergency Management Act 2002 (CDEM Act).

Benefits of pre-event land use planning

The benefits of pre-event land use planning are evident in the short- to medium-term recovery phase after an event. The CDEM Act defines recovery as "the co-ordinated efforts and processes used to bring about the immediate, medium-term, and long-term holistic regeneration and enhancement of a community following an emergency" (s4). Recovery has short-term (immediate restoration) and long-term (reconstruction and returning to previous or improved function) phases.

Recent natural hazard events (e.g. CES and North Island Weather Events) demonstrate recurring land use issues that slow recovery and negatively impact communities. While such events cause damage, the recovery period offers opportunities to consider community goals and make meaningful changes. Pre-event land use planning can prepare a community for these challenges, providing a head start in recovery and enabling opportunities for improvement to be realised.

It is important to note that pre-event land use planning may not always be implemented as per the final 'plan', as it is difficult to anticipate the exact event or outcome. However, the development of relationships as part of the planning process allows for a shared vision and goals to be developed, alongside an agreed structure within which adaptable actions can be taken. Overall, this will prompt several benefits, including the following.

Enhanced resilience

There are two main factors that determine a community's resilience to natural hazards: the severity of impact and the speed and effectiveness of recovery. Pre-event land use planning enhances resilience both by incorporating risk reduction strategies during recovery (thereby reducing future impacts) and by reducing recovery times.

Anticipating potential natural hazard events and preparing for their impact speeds up recovery decision-making and action. For example, pre-event land use planning can facilitate planned relocation (including any acquisition or re-zoning of land and any buy-out schemes), inclusion of new or revised hazard mapping and overlays, and debris management (i.e. consent requirements), each of which makes post-event processes faster, leading to quicker recovery and more resilient communities.

Sustainable development

Sustainable development refers to our ability to meet the needs of the present without compromising the ability of future generations to meet their own needs[4]. Pre-event land use planning can contribute to sustainable development aspirations as it encourages a range of options to be considered before an event.

This allows for the most sustainable options for issues such as waste management to be prioritised and implemented, rather than needing to rely on the fastest options or Orders in Council after an event.

Pre-event land use planning can promote sustainable development by contributing to the retention of residential insurance, as insurers can have confidence in the governance arrangements. Natural hazards insurance is a critical tool in the risk management toolbox. It increases financial resilience and helps the financial recovery of homeowners and communities.

But insurance only contributes to direct costs (the cost of damage); it rarely stretches to indirect costs (e.g. flow-on effects to the economy) and does not cover intangible costs (the economic cost of social impact). Insurance 'retreat' is also becoming an issue where the risks are deemed too high by the insurers to provide cover. Through implementing pre-event land use planning and prioritising risk reduction during recovery, the retention of insurance for future generations can be supported.

Improved engagement

After a natural hazard event, councils, mana whenua, and other stakeholders are often at capacity and are unable to engage as they normally would.

Pre-event land use planning helps by consulting with, and understanding the needs and requirements of, councils, iwi and other stakeholders beforehand, creating a streamlined approach post-event.

For example, business as usual (BAU) engagement responsibilities can be reduced for the first few months of recovery, based on the pre-agreed requirements. By undertaking this engagement pre-event, relationships can be built or enhanced, and forms an efficient basis for post-event engagement, saving time and resources.

4 Brundtland Commission, Our Common Future. Report of the World Commission on Environment and Development. United Nations, 1987.

Improved coordination

Effective recovery involves various stakeholders across different sectors, each with unique and shared responsibilities. Clear plans and protocols enhance coordination during and after natural hazard events. This improved coordination results from land use planning outputs, like agreements and plans, and through pre-event engagement and consultation, fostering essential stakeholder relationships and shared recovery goals.

Cost savings

A 2024 study by the US Chamber of Commerce[5] found that every dollar invested in disaster readiness saves $7 in economic costs post-event. Additionally, $1 spent upfront reduces damage and cleanup costs by $6. Overall, investing $1 in resilience and preparedness saves communities $13. Pre-event land use planning further reduces recovery costs and prevents future economic losses.

Anticipating policy changes

A major advantage of pre-event land use planning is being able to anticipate policy changes that may be required after an event. Policy changes can include rezoning land to either restrict types of future activities, or to open further greenfield sites in areas of less risk for people to relocate to, temporarily easing restrictions to allow for a more efficient recovery and extinguishing of existing use rights if required.

After a natural hazard event there may also be new hazard and risk information that requires policy changes, such as updating hazard overlays in a district plan, to ensure any new developments (and associated policies) are appropriate for any changes in hazard and risk. Pre-event land use planning enables councils to anticipate necessary policy changes and respond swiftly after events, leading to better outcomes for communities.

5 https://www.uschamber.com/security/the-preparedness-payoff-the-economic-benefits-of-investing-in-climate-resilience

Who benefits from pre-event land use planning?

Pre-event land use planning has the potential to benefit a multitude of stakeholders, including but not limited to, those directly affected by a natural hazard event, ratepayers, iwi/hapū, infrastructure providers, local and regional councils, and insurers. There are also co-benefits of raising the awareness of potential events, such as those at risk being able to prepare and make better decisions before an event occurs. Below are some examples of stakeholder benefits.

Those directly affected

Those directly impacted by a natural hazard event will experience faster, more efficient, and coordinated recovery if pre-event land use plans are in place before the event occurs. It will also reduce emotional and financial stress, building long-term resilience in communities and organisations involved in land use recovery.

Ratepayers

Anticipating land use policy changes before an event helps councils make quicker decisions and develop policies faster during recovery. This efficiency lowers costs for ratepayers and shortens the community recovery period.

Iwi/hapū

During response and recovery, iwi and hapū provide community support by opening marae for food, shelter, and information.

They can manage their own and the wider community's recovery, and engage in decision-making with agencies and community members. Anticipating necessary decisions and streamlining engagement can reduce the burden on iwi and hapū, and provide opportunities for collaboration and improved communication.

Infrastructure providers

Pre-event land use planning can help identify which infrastructure is most vulnerable to a natural hazard event, and allow for planning measures for its protection from physical damage and financial loss. In addition, network utility operators and councils can undertake ‘emergency works’ (s330 of the RMA) to secure important public or economic functions of utility operations from an emergency event, or if councils’ physical assets are under significant threat without the need for immediate resource consent. Once emergency work has been undertaken, a resource consent is then required if one would have been required under ‘business as usual’. Anticipating what these emergencies could be, and their consequences, could help prepare infrastructure providers for the type of consents (and consultation) that may be required.

Pre-event land use planning, including how to leverage recovery as an opportunity for betterment, has also previously been identified as a need for critical infrastructure[6].

6 Critical infrastructure research needs summary, QuakeCoRE workshop, September 2024.

Local and regional councils

Pre-event land use planning is advantageous for various teams within territorial and regional councils, including policy planners, building inspectors, engineers, compliance monitors, emergency managers, and community relations and engagement staff. It helps them prepare for events, supports recovery activities, and enhances community resilience and sustainability. Additionally, it clarifies staff responsibilities before and during recovery.

Insurers

Pre-event land use planning may help insurers reduce claim severity and frequency, speeding up claims processing and stabilising risk profiles. By using scenarios to model impacts and recovery trajectories, insurance responses can be tested before an event occurs.

Quick decisions on repair, build, or relocation can be made with pre-defined land use criteria. Fewer, less severe claims lower insurers' financial liabilities, which may allow them to offer lower premiums or better coverage, boosting policyholder retention.

Climate adaptation and natural hazard risk reduction

This Pre-Event Land Use Planning Methodology has been developed for use by councils across their risk reduction and adaptation activities to enable better decision-making. The concepts of climate adaptation and natural hazard risk reduction are often used in isolation of each other, but they are complementary concepts that should be used together (see Figure 1). Typically, adaptation is exclusively applied in relation to climate change and is defined as the "…process of adjusting to actual or expected climate and its effects, to moderate harm or take advantage of beneficial opportunities"[7]. While risk reduction is defined as "… preventing new and reducing existing disaster risk …"[8]. Adaptation and risk reduction are subsets of each other and should be applied across all hazards to enable better risk-based decision-making, that is able to target issues of exposure and vulnerability. Planning policy can act as the bridge between adaptation and risk reduction and should be utilised to ensure the concepts are used in tandem.

Pre-event land use planning can also be used to support the dynamic adaptive pathways planning (DAPP) approach. DAPP refers to a planning approach that identifies options for risk management, while accommodating uncertainty and remaining responsive to change. DAPP is predominantly used for climate change adaptation, but it can also be applied to other hazards by selecting pathway options that support risk reduction for these types of hazards. Pre-event land use planning supports the use of DAPP by pre-planning each of the decision points and pathways.

Climate change adaptation and disaster risk reduction

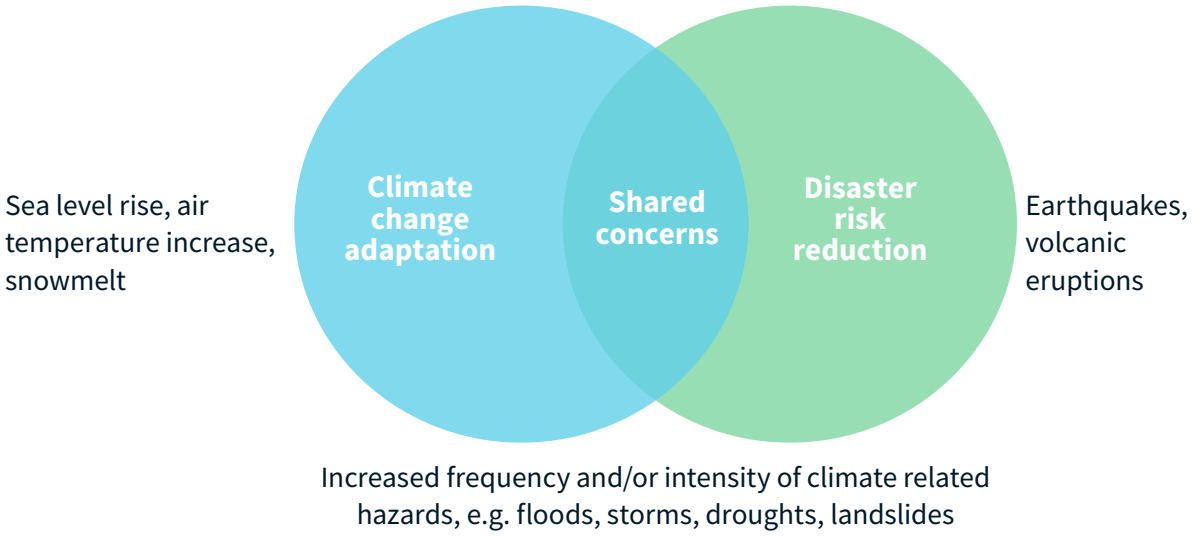

Figure 1: The relationship between climate change adaptation and disaster risk reduction[9].

7 https://environment.govt.nz/publications/aotearoa-new-zealands-first-national-adaptation-plan/

8 https://www.civildefence.govt.nz/cdem-sector/plans-and-strategies/national-disaster-resilience-strategy

9 Adapted from Turnbull, M. Sterrett, C.; Hilleboe, A. (2013) Toward Resilience: A Guide to Disaster Risk Reduction and Climate Change Adaptation. Practical Action Publishing: Warwickshire. pp7.

Methodology

This methodology (see Figure 2) has been developed to guide pre-event land use planning for specific land use planning activities that are commonly seen following natural hazard events. It is targeted towards local planning authorities and comprises a seven-step process:

1. Articulate and set the land use recovery objectives
2. Assess the current and future hazards and risks that can impact communities
3. Undertake a risk tolerance assessment
4. Assess the planning options that will enable a resilient land use recovery such as post-event consultation requirements, consents requirements, and potential policy changes
5. Prepare the pre-event land use plan
6. Implement the pre-event land use plan and actions, through legislative, non-regulatory and community-based opportunities
7. Sustain awareness of the plan and review when required

Each of these steps is outlined in the following sections.

Using scenarios is an important part of using the methodology, as they allow for context-specific planning, depending on the hazards of the area, exposure and vulnerability. While an exact scenario event is not likely to occur, the benefits of using scenarios include:

- flexibility – can be used for a specific hazard, and/or for cumulative and cascading hazards
- gap identification – can highlight the implications of different land use recovery options and provide pathways for action
- testing outcomes – can enable decision-makers to experiment in relative safety and in ways that aid understanding and action. Similarly, scenarios can support the testing of assumptions about land-use changes from an event
- thought leadership – can enhance the capacity to envision and prepare for different outcomes and allow uncertainties to be explored and potential consequences to be understood
- awareness building – by simulating realistic disaster events, scenarios enable council staff and communities to explore how the plan would be applied in practice, fostering a deeper understanding of roles, responsibilities, and decision-making processes.

The result of using this methodology should be a clearly articulated pre-event land use plan that summarises the actions and options required during a recovery period. Although a pre-event land use plan cannot predict specific outcomes, it enables a council and community to analyse options, achieve a faster recovery, and foster more resilient relationships.

Articulate and set the land use recovery objectives

What are the land use recovery objectives after an event?

Use these objectives to set desired outcome(s), provide direction and purpose, and ensure efforts are aligned and to track progress.

Assess the current and future risks from natural hazards

Evaluate hazard and risks from existing information, including but not limited to, hazard maps, modelling outputs, critical infrastructure locations, existing and future population densities, sensitive land uses.

Undertake a risk tolerance assessment

Using the outcome from above, understand what level of consequences are considered acceptable, tolerable or intolerable by Council, the community, iwi, infrastructure providers, and experts. Identify areas that may need to adapt/change land use after an event. Use this assessment to develop criteria and policy options for land use recovery and risk reduction, e.g. repair, rebuild, or relocate.

Assess planning options for land use recovery

Consider any Te Tiriti obligations, Mana Whakahono ā Rohe arrangements, implications for Māori land.

Post-event consultation requirements	Consents	Policy changes
Iwi, community BAU District Plan stakeholders Response and recovery stakeholders Pre-agreed arrangements	Fast tracking for recovery Debris disposal Earthworks Assessment of Environmental Effects	Re-zoning of land, community relocation Temporary easing of restrictions More restrictive longer-term policies Revised hazard extents (overlays)

Prepare the pre-event land use plan

Consult with iwi, community, infrastructure providers, and other key stakeholders on pre-event plan.

Implement the pre-event land use plan

Implement pre-event actions in plan; use the plan to inform other planning tools

Legislative	Non-regulatory	Community-based
Regional Policy Statement District Plan Regional Plan CDEM Group Plan Long Term Plans	Pre-event policy changes as a non-regulatory chapter in the district plan Structure/Spatial Plans, Growth Strategies	Iwi/hapū Management Plans Community Response Plans Adaptation Plans

Sustain awareness of the plan and review

Use scenarios to build knowledge of the plan with council staff and communities.

Monitor any land use changes that could affect natural hazard risk, or natural hazards that could affect land use.

Review the plan if substantial land use, legislative, or risk tolerances change.

Figure 2: Methodology for pre-event land use planning.

Each step of the methodology outlined in Figure 2 is explained in greater detail below.

1. Articulate and set the land use recovery objectives

Setting objectives in a pre-event land use plan is crucial for establishing a clear framework that guides decision-making, coordination, and evaluation – both before and after a disaster. Objectives articulate the purpose of the plan (the "why"), and the outcomes that are being sought. They help to align councils, communities, stakeholders, and resources around land use recovery goals. Objectives also serve as benchmarks to monitor land use recovery progress, evaluate the effectiveness of land use decisions, and align other strategies based on outcomes and lessons learned.

2. Assess the current and future risks from natural hazards

Understanding hazards and risks specific to a community is a key part of pre-event land use planning. This allows for the likely impact on a community to be assessed, across a variety of domains including the natural environment, the built environment, social wellbeing, the cultural environment, and the economy.

To understand the risk to a community, exposure and vulnerability must be assessed. Exposure refers to the things we value that are present in the location where a natural hazard event may occur and therefore are subject to potential impact or loss.

The things we value include our people, our health and wellbeing, infrastructure and buildings, our economy, and the environment. Vulnerability refers to the characteristics and/or inherent qualities that make the things we value susceptible to or protected from a natural hazard event. Exposure and vulnerability can influence the impacts from a natural hazard event, and changing exposure and vulnerability can reduce risk.

3. Undertake a risk tolerance assessment

Another component of understanding the hazards and risks is completing a risk tolerance assessment. Understanding risk tolerance (i.e. our willingness to bear a risk) means we can assess and treat our risk in relation to the things that we value the most (e.g. our health, economy, environment, buildings, and infrastructure). The NHC Risk Tolerance Methodology[10] (Appendix 1) was developed to provide a framework for assessing risk tolerance, and provides recommendations for consistent risk tolerance terminology, and how to assess our ability to cope with the risk.

Appendix 2 provides examples of risk thresholds and criteria. Assessing risk tolerance supports land use recovery planning because it allows us to further understand our risk and how different stakeholders and the community feel about that risk, which can inform land use planning priorities. The process of understanding hazards and risks may also reveal where there are gaps in knowledge. Once gaps in knowledge have been identified, funding for future research can be prioritised.

10 https://www.eqc.govt.nz/resilience-and-research/reducing-risk/risk-tolerance-methodology/

In addition, understanding risk tolerance before a hazard event provides a valuable baseline for comparison and decision-making after the event, when risk perceptions often shift due to lived experience, trauma, or new information. This pre-event understanding helps identify what levels of potential loss individuals, communities, and institutions were previously willing to accept, which can inform whether post-event changes in tolerance are temporary emotional responses or reflect a genuine shift in values and priorities. It also enables more transparent and consistent decision-making during recovery, as pre-established thresholds and criteria can guide actions even when emotions and pressures are high.

4. Assess planning options for land use recovery

Understanding the policies and rules that will be both triggered and required during a recovery period is critical for faster decision-making. As well as district plans being a key policy document with rules, other plans should also be assessed for their role in recovery, their implications for land use decision-making, and if any changes may be required for land use recovery. These include the local Civil Defence and Emergency Management Group Plan (i.e. response and recovery roles and responsibilities)[11]; the Long Term Plan (for funding opportunities and implications); iwi/hapū management plans; and any local climate adaptation plans.

When considering the potential consequences for land use planning from the exposure and vulnerabilities, an assessment of the different rules and policies that will be triggered during response and recovery should be undertaken. Hazard and risk scenarios are a good option for testing what triggers certain rules, and what changes or new rules may be required to manage the land use recovery more effectively. Scenarios can be used to test each of the following activities.

Consultation

Agreeing post-event engagement and consultation processes and expectations with stakeholders and communities is crucial. After a natural hazard event, iwi and other stakeholders may be overwhelmed and unable to engage as usual. Pre-agreed consultation arrangements can ease this burden by setting clear expectations and triggers for consultation. Planning processes and implications for iwi/Māori must be considered, including Te Tiriti o Waitangi obligations and any Mana Whakahono ā Rohe[12] arrangements. Arrangements for community consultation will also need to be reviewed as part of pre-event land use planning. The most effective recoveries are those that are locally led and informed by community needs, therefore, provisions need to be in place that facilitate effective community engagement and consultation after a natural hazard event.

11 See https://www.civildefence.govt.nz/assets/Uploads/documents/publications/guidelines/directors-guidelines/20/17-strategic-planning-recovery/Strategic-Planning-for-Recovery-DGL-20-17.pdf

12 Mana Whakahono ā Rohe is an iwi participation arrangement tool designed to assist tangata whenua and local authorities discuss, agree and record how they will work together under the Resource Management Act (RMA). This includes agreeing how tangata whenua will be involved in decision-making processes.

Land use consents

Existing consents and the consenting process should be reviewed to ensure their adequacy for facilitating land use recovery following a natural hazard event. The consent assessment process should particularly focus on debris and waste management, as natural hazard events typically generate significant amounts of waste and debris that can easily overwhelm existing management systems and processes. It is also an opportunity to assess the capacity to process high volumes of consent applications.

Policy changes

After a major event, BAU planning processes may need revision to support land use recovery. For example, spatial overlays and land use zones; allowances for temporary activities (such as temporary accommodation); and strategies for planned relocation. These processes should be evaluated for their ability to address recovery planning issues and facilitate the implementation of options.

All risk reduction and adaptation land use planning policy options for resilient land use recovery need to be considered. Planning for these measures before recovery allows for thoughtful consideration of all possibilities without post-event pressures. Options should address who and what will be affected by natural hazard impacts in the short, medium, and long term, influencing both land use and policy direction (i.e. for risk reduction and adaptation outcomes).

Once all possible options have been identified they need to be prioritised. Prioritisation needs to occur because there will be limited time and resources after a natural hazard event to re-assess and implement all the options, and actioning certain options may influence other responses. To inform prioritisation, the timeliness, cost and impact of options should be considered, including how much time it will save during a recovery and what the short-, medium-, and long-term consequences will be. Prioritisation should also be informed by the risk tolerance assessment completed as part of understanding the context, to ensure the outcomes are acceptable to that community. This includes assessing who is affected, any implications of who will make the decision, and who will live with the outcomes.

5. Prepare the pre-event land use plan

The pre-event land use plan must be drafted, reviewed, finalised, and implemented. As part of the drafting and finalising process, communities, including iwi and other key stakeholders, need to be consulted on the plan. These stakeholders should be agencies and representatives that will have a key role in recovery from natural hazard events or those that are likely to be affected by decisions. Engaging with local partners and stakeholders – particularly iwi/Māori, who may have specific requirements due to Te Tiriti o Waitangi obligations and settlements – during this stage of pre-event land use planning increases the likelihood of establishing shared land use recovery goals. This can support faster and more coordinated recovery efforts through actions such as reviewing rules, testing scenarios, and developing a recovery plan.

6. Implement the pre-event land use plan

Actions and options from the pre-event land use plan can inform other planning tools. Recovery and land use planning are interconnected, so improvements from pre-event planning should be applied system-wide for optimal recovery outcomes. Planning tools that could benefit include legislative plans (District and Regional Plans, Long Term Plans, CDEM Group Plans), non-regulatory plans (Spatial Plans, Growth Strategies), and community-based plans (adaptation and response plans).

7. Sustain awareness of the plan and review

To ensure the ongoing relevance and effectiveness of the pre-event land use plan, it is important to sustain awareness and regularly review its content.

Scenario-based exercises can be used to build familiarity with the plan among council staff and communities. Ongoing monitoring of land use changes is also essential, particularly where these may influence natural hazard risk – or where evolving natural hazards may impact land use decisions. The plan should be reviewed and updated if there are significant changes in land use patterns, legislation, or community risk tolerances.

Understanding of hazard, risk, and risk tolerance will change over time, as will the effectiveness of policies, and planning requirements. There should be commitment and budget for a frequent evaluation and review period for the pre-event land use plan (five-yearly recommended), including the context and risk tolerance assessments.

Examples of each of these aspects is presented in Figure 3.

	Examples
What are the land use recovery objectives after an event?	To guide development away from high-risk areas and promote land use patterns that reduce vulnerability to natural hazards, ensuring the long-term safety and sustainability of the community.
What is the current understanding of the hazards and risks?	Are there any gaps in knowledge and understanding? Where are the priority areas that will likely need changes in land use policy to remain sustainable?
Are the risks, both pre- and post-event, OK? Is action required now to reduce risks?	Use scenarios to test risk tolerance levels. What criteria for land use thresholds will be required? What changes can be made now to reduce risks?
How can existing planning process be improved for recovery?	What consultation processes could be streamlined? What mechanisms can assist relocation (e.g. insurance plans, fast track resource consents)? What District Plan policies and/or rules may need to change? What actions are needed now to secure land for relocation prior to, or following, an event? Can Orders in Council be drafted?
Prepare pre-event plan in consultation with key stakeholders	Spatial plans i.e. what land use should go where? CDEM Group recovery planning. Flood and coastal management plans. Expectations of community for response planning.
Use the resulting outputs to inform other national, regional, and local planning tools	Identify key stakeholders and consult on plan. Outline which planning mechanisms can assist recovery (e.g. fast track resource consents).
Scenario test, monitor, review	Review the risk profile if a major event or development occurs. Regularly use scenarios with planners and communities to test assumptions, find any gaps or opportunities. Review and update the plan as required, including the context and risk tolerance assessments.

Figure 3: Examples of questions and actions the methodology could address.

Using this methodology

This methodology should be used to guide potential land use recoveries (i.e. through the district plan) from natural hazard events. When using this methodology, the following should be considered and thoroughly documented:

- The information that has been used to understand the local hazard, and risk context, including risk tolerance. This should be based on the best available information such as scientific data and/or modelling. In the absence of scientific information, the most appropriate information should be used, such as local knowledge or historical accounts, with a confidence rating. Any limitations of that information should also be documented, including any uncertainties and how they are managed.
- Details of any scenarios that are used, and how they are used.
- All the risk reduction and adaptation options that were considered and assessed including what options have been prioritised and why. This should include reference to the risk tolerance assessment, as options are often a balance between the tolerance of cost versus benefit.
- Who was consulted as part of the development of the final plan, and what the outcomes of that consultation were.
- The current planning processes and the changes that need to be made (before and/or after an event) to ensure that they are fit for purpose. This should include a differentiation between changes and actions that can be completed now and those that could/ will happen during a recovery period.
- The consultation and drafting process that was used to develop the land use recovery plan.
- The implementation pathway to ensure that any risk reduction options and planning changes will be effective during a recovery.
- An agreed and documented review period. There must be a committed, well-funded process for regularly reviewing and updating the pre-event land use plan, ideally every five years.
- Any uncertainties, assumptions and limitations should be articulated, and ways to address these in the future proposed.

Examples of how the methodology could be used

Pre-event land use planning for dynamic adaptive pathways

Pre-event land use planning is complementary to dynamic adaptive pathways planning (DAPP), aiming to pre-plan the land use planning processes associated with each pathway and trigger. DAPP is an approach that outlines triggers and multiple different pathways or options for mitigation and/or risk reduction. Once a trigger is reached, the affected community can choose to stay on the same pathway (until it reaches an end) or select a new pathway. To demonstrate how pre-event land use planning can be applied to DAPP, an example is provided for a fictional community called 'Ocean View'[13].

In this scenario, Ocean View is a coastal New Zealand community facing a variety of hazards that are projected to intensify with climate change. To navigate this uncertain future, the community has adopted the DAPP approach.

The potential pathways are illustrated in Figure 4, with corresponding trigger points detailed in Table 1. By applying the pre-event land use planning methodology to the DAPP framework (Figure 5), each pathway can be proactively planned for. This forward planning enables more efficient decision-making and implementation once a trigger point is reached.

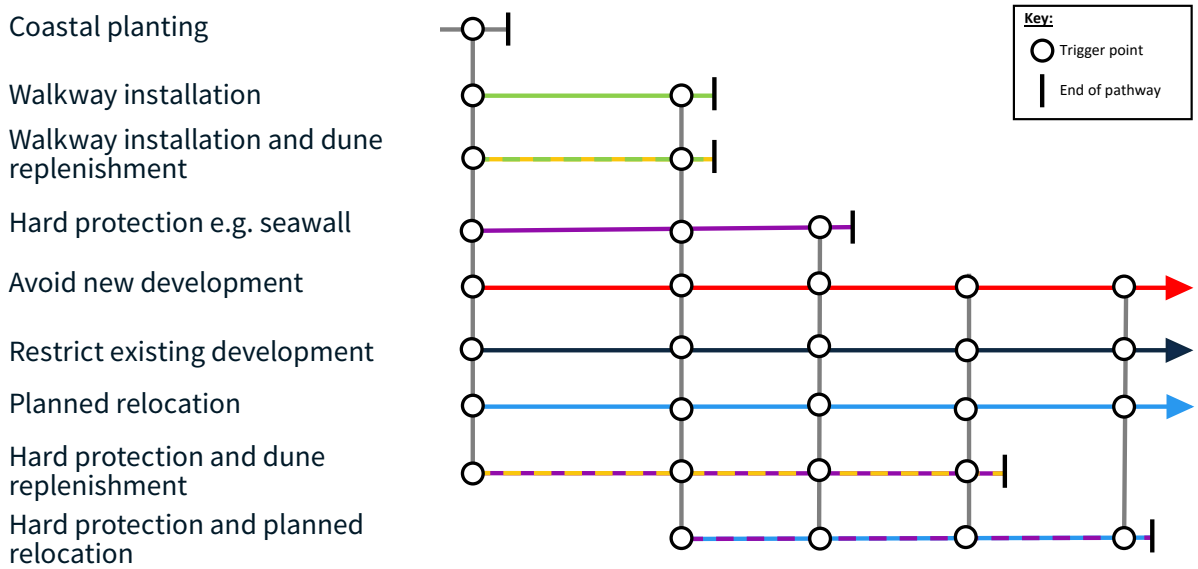

Figure 4: DAPP map for Ocean View.

13 Adapted from the Amberley Beach Coastal Adaptation Plan, https://www.hurunui.govt.nz/environment/coastal-conversations-in-the-hurunui/amberley-beach.

Table 1: Triggers for Ocean View DAPP.

Trigger	Explanation
Flood event	Inundation in one flood event reaches over 0.15m.
Insurance retreat	First property loses insurance for coastal hazards.
Damage to dune system	Dune is depleted by more than 20% in a single storm event.
Cost of hard protection structure	Maintenance of a hard protection structure reaches more than $500 per property.
Damage to property	30% of residential dwellings require significant repairs or rebuilding after a natural hazard event.
Subsequent natural hazard events	Significant natural hazard events occurring within 6 months of each other.
Infrastructure upgrade	A significant upgrade to council owned infrastructure is required.

Articulate and set the land use recovery objectives

Objective 1: Avoid exposure to the most severe coastal natural hazards, maintain insurability and serviceability to critical infrastructure.

Objective 2: Pathways are selected and implemented in a timely manner once triggers have been reached.

Assess the current and future risks from natural hazards

The entire Ocean View community (including homes, infrastructure, and the community hall) is exposed to natural hazards including coastal erosion, rising groundwater, coastal flooding, river flooding, and pluvial flooding. These hazards (and their associated impacts) are expected to be exacerbated by the effects of climate change and sea level rise. The likely impact from these hazards include damage to residential property, infrastructure, community assets, and the possibility of insurance retreat. Building losses from natural hazard events in Ocean View are expected to reach over $10m by 2050.

Undertake a risk tolerance assessment

For a spatial planning timeframe (~30 years) the present level of risk has been deemed tolerable based on the current coping capacity of the community and the risk treatment options in place (a sea wall protecting existing development). However, when using scenarios to demonstrate how natural hazards and their impacts will change in the future (from the effects of climate change), it is evident that the risk will become intolerable for the community. This will require additional planning and risk treatment options (as part of DAPP) to ensure that Ocean View can remain a vibrant community and achieve their land use recovery objectives.

Assess planning options for land use recovery

The following post-event consultation requirements will be pre-planned:	The following consents will be pre-planned:	The following policy changes will be pre-planned:
Communicating to the community when trigger points have been reached. Decision-making processes for pathway selection. Engagement on acquiring land, zoning land, and funding arrangements.	Consents for walkway installation, and coastal planting. Consents for the installation of monitoring equipment to observe when trigger points have been reached.	Policy changes for planned relocation. Changes to policy for restricting development. Updated hazard overlays in the district plan as sea level rise and coastal erosion worsen over time. Policy changes to enable and/or restrict hard protection structures.

Prepare the pre-event land use plan

Consultation with iwi, the community, and stakeholders is used to prepare the pre-event land use plan. The final plan is an outlined set of actions that will be undertaken before trigger points are reached and new pathways are chosen.

Implement the pre-event land use plan

Legislative	Non-regulatory	Community-based
District plan is updated to reflect policy changes to restrict development and update hazard overlays.	Growth strategies for Ocean View reflect the land use recovery objectives and risk tolerance of the community. Pre-event land use planning is added as a non-regulatory chapter in the district plan.	The community adaptation plan, which includes the DAPP approach, is updated to reflect the development of a pre-event land use plan.

Sustain awareness of the plan and review

Scenarios, showing different triggers and pathways, can be used to test and review the pre-event plan. The plan will need to be reviewed as risk tolerance levels change over time and as the DAPP approach is implemented.

Figure 5: An example of the application of DAPP to pre-event land use planning.

Napier pre-event land use planning scenario example

Pre-event land use planning can be applied to planned relocation to ensure an efficient and effective process by considering different options and associated planning responses ahead of time. Chuang et al. 2024 (University of Auckland)[14] have developed an illustrative example of pre-event land use planning by developing two scenarios for planned relocation out of high flood risk areas in Napier.

The scenarios consider how development in Napier could change from a spatial perspective (i.e. where housing and green space should go) and from a planning perspective (i.e. how well does the proposed district plan accommodate for these planned relocation options). The scenarios were developed using a desktop exercise and without community engagement. In practice, planned relocation and pre-event land use planning must incorporate extensive engagement. The following excerpt explains the two development scenarios:

"The first scenario envisions medium-density redevelopment in areas previously deemed high-risk.

This strategy minimises residential displacement while providing substantial redevelopment capacity, allowing the local community to remain in familiar locations and supporting future growth. The second scenario proposes high-density development in the city centre, focusing on utilising underdeveloped sites to their full land use potential. This strategy seeks to alleviate pressure on high-risk areas by accommodating more residents centrally, thus reducing the need for relocation and enhancing overall urban management. In both scenarios, former high-risk areas would be converted into public green spaces with robust connections to existing green areas, improving the city's resilience and environmental quality." (p.1)[14]

Figure 6 on the next page shows how the illustrative planned relocation[14] example aligns with the NHC pre-event land use planning methodology.

14 Chuang, I. T., Wingate, B., Li, Z., Von, L., & Beattie, L. (2024). Napier risk management spatial plan (working project). School of Architecture and Planning, Urban Design Hub, University of Auckland.

Articulate and set the land use recovery objectives		
Objective 1: Achieve well-functioning urban areas now and into the future, while maintaining the existing sense of community in Napier. **Objective 2:** Spatial planning is efficient and effective at reducing flood risk.		
Assess the current and future risks from natural hazards		
The scenarios in this example only consider flood hazard, despite Napier's high exposure to other natural hazards including ground shaking, liquefaction, landslide, and tsunami. Chuang et al have identified three main high flood areas in Napier, where flooding is expected to be between 300-499mm in a 2% AEP event. There are currently ~1500 properties exposed in these high flood hazard areas. Flood risk in Napier is likely to increase in the future from climate change exacerbating the effects from natural hazards and from population growth. Napier's population is projected to grow and an additional 2000-6000 dwellings will be required in the short to medium term to support this growth.		
Undertake a risk tolerance assessment		
A risk tolerance assessment has shown that the flood risk in Napier is currently tolerable, but will become intolerable in the future with the projected population growth and exacerbated flood impacts.		
Assess planning options for land use recovery		
The following post event consultation requirements will be pre-planned:	**The following consents will be pre-planned:**	**The following policy changes will be pre-planned:**
Engage with residents through the process. There must be a robust system in place for regular consultation and feedback. Communities must understand the risks and the options for managing them including pre-planning recovery and planned relocation.	Consents for development in infill areas throughout the city. Consents for development of additional cycleways and walkways to create usable greenspace for the community in the current high flood areas.	Changes to accommodate increased height restrictions. Allow for intensification out of high flood hazard areas to support the shift from 1-2 storey residential to 2-3 storey terraced housing. Rezoning of current developed areas to create green spaces. Flood hazard overlays will need to be updated once green spaces have been developed and can accommodate stormwater.
Prepare the pre-event land use plan		
The final pre-event land use recovery plan will outline clear actions across consultation, consents, and policy that can be taken ahead of time to ensure that Napier is equipped to implement spatial planning changes immediately following a flood event and/or before these events occur.		
Implement the pre-event land use plan		
Implement pre-event actions in plan; use the plan to inform other planning tools.		
Legislative	**Non-regulatory**	**Community-based**
District plan is updated to allow increased density in lower flood hazard area.	Pre-event land use recovery planning is included as a non-regulatory part of the district plan.	This planned relocation approach is incorporated into a community adaptation plan for Napier to ensure the city is resilient to the effects of climate change.
Sustain awareness of the plan and review		
Scenarios showing different flood events can be used to test and review the pre-event plan. The plan will need to be reviewed as risk tolerance levels change over time and as the community starts the planned relocation process.		

Figure 6: Application of pre-event planning methodology to planned relocation example from Chuang et al.

Appendix 1: NHC Toka Tū Ake Risk Tolerance Methodology

What is the decision for, over what timeframe?				
What decision will the risk tolerance assessment inform? What is the policy timeframe the risk tolerance decision will manage for?	~10 years	~30 years	~50 years	~100 years
	Government policy	Spatial planning	Built environment design	Climate change adaptation

What could, or did, happen?					
Use **scenarios** of an event **OR** use impact data, hazard and risk assessments to assess the consequences of an event. Use the considerations below to test the coping capacity.					
Social	**Economic**	**Governance sovereignty**	**Natural environment**	**Cultural**	**Built**
How many deaths, injuries, or illnesses will occur? Will mental health or public wellbeing suffer? Will the impacts be felt equitably?	How much will it cost to repair any damage? Will the risk disrupt the local or regional economy? How much disruption is ok?	Will the ability to govern be impeded? Does public perception demand or prevent a certain action? Does the risk affect NZ sovereignty?	How will the environment be affected? Will irreversible damage be done to an ecosystem? Does the risk affect how the environment affects society?	Does the risk affect places of cultural or archaeological significance? Will the risk preclude future generations from some experience or resource?	Will the risk prevent normal use or function of buildings? Will the risk disrupt normal infrastructure or utility service levels?

Who is affected?	What is the scale?	Who lives with it?
Homeowners – insured, non-insured, renters. Iwi/hapū – housing, marae, urupa. Infrastructure providers – roads, power, communications. Council – regional and/or district; other stakeholders.	Local – affects those both in and out of the hazard extent. Regional – a number of districts are affected. National – significant social and economic impacts.	Does this require a short-, medium- or long-term fix. Are people empowered to modify their own risk? Is there an equitable spread of consequences?

Is this ok?
Use the **pre-event OR post-event criteria table** to guide decision making using risk tolerance thresholds.

If not ok, how can the risk be treated?		
What are the options, and are they acceptable to the wider community, iwi, council, and infrastructure providers, both now and in the future?		
Who decides?	**Who pays?**	**Who lives with it?**
Who participates in the decision-making – what are their values? Is the process robust, transparent and documented? Who has the authority to enact a change?	Do those who create the risk experience it or pay for its treatment? What is the opportunity cost of doing nothing? Is it cost effective to treat the risk?	Property specific or wider community benefit? Who will maintain it? What are the long-term environmental, social and economic implications?

Which treatment option provides the best outcome?		
Use the **pre-event OR post-event criteria table** to guide decision-making using risk tolerance thresholds.		
Acceptable	**Tolerable**	**Intolerable**
Broadly acceptable. Monitor and maintain assurance that risk remains at this level.	Risk is accepted if benefit gained is shown to outweigh the risk. The risk can be mitigated at a cost proportional to the benefit gained.	Risk cannot be justified except in extraordinary circumstances. Activity must cease until risk is removed or reduced.

Appendix 2: Setting risk thresholds and criteria

This methodology can set risk thresholds and criteria for land use recovery. Having a clear process ensures a robust and transparent approach to implementing risk-based policies. For instance, if a policy requires an 'acceptable' risk level, there must be a consistent method for assessing that risk over time using metrics, rather than relying on one person's judgment alone.

There are many challenges with setting risk thresholds, for example setting life risk thresholds, scalability (e.g. thresholds that are relevant across large or small communities), and reconciling varying risk tolerances. Metrics for thresholds can be either qualitative, quantitative, or both; regardless, metrics need to be measurable and rely on information that is available. Descriptive criteria can be useful to ensure that the intent of the threshold is clearly understood.

Pre-drafting risk tolerance thresholds (e.g. acceptable, tolerable, intolerable) and criteria are key actions for pre-event land use planning and can result in the land use planning response for recovery being a faster process. For example, decisions on whether to repair or demolish buildings could be made more efficiently if criteria for land use recovery has been pre-drafted, so that only modifications are required without the need to start drafting from the beginning.

The following tables provide two examples of risk thresholds and criteria guidance, based on two scenarios:

1. Categories for short-term land use response and recovery after an event, i.e. responding to land use recovery options based on damage from an event
2. Categories for pre-event land use planning, i.e. long-term response to how planning needs to change to allow for a more efficient recovery

Each of the examples in Tables 2.1 and 2.2 include a category description, category example, criteria, risk threshold, and a metric for how the threshold can be measured. A risk tolerance assessment will be required to inform the thresholds and criteria. While Tables 2.1 and 2.2 are examples, they are consistent with the government categorisation used for properties following Cyclone Gabrielle[15], and should be adapted as required.

15 https://www.beehive.govt.nz/release/update-assessment-affected-properties-post-cyclone-and-flooding.

Table 2.1: Example of post-event damage categories, criteria and risk thresholds for land use recovery.

Level of risk	Title	Explanation	Risk threshold	Metric	Planning response
Low	Permitted/ Controlled	Risk to people and property is acceptable; activity can occur with no or limited controls.	N/A	Assessment of life safety is less than 10^{-6} – 10^{-5} per year (AIFR).	Enable development.
Moderate	Discretionary	Risk is accepted only if the benefit gained from repairs and protection is shown to outweigh the risk. Tolerable only if risk can be mitigated at a cost proportional to the benefit gained.	The sustainable use of the land can continue with cost effective risk reduction measures; and Communities can cope with the impacts from natural hazard events. The life safety risk and/or functionality of the land use can be managed to safeguard the future of the land use. Infrastructure can be maintained and developed with effective risk reduction measures.	Area being assessed will need to develop or use their risk tolerance thresholds based on local catchment characteristics. Area-specific coping capacity indicators will need to be developed. Availability of insurance e.g. is insurance retreat a possibility? Assessment of life safety is between 10^{-5} and 10^{-4} per year (AIFR).	Existing uses may need adaptive responses to reduce increasing risks e.g. Dynamic Adaptive Pathways Planning. Further development may require restrictions/mitigation measures/ resilient design. Changes of use do not increase risk.
High	Non-complying/ Prohibited	Impacted by event(s); and Imminent risk to life; and/or Land damage makes rebuild technically or economically infeasible; and/or Unacceptable future risk to assets (life, land, property, infrastructure etc) and compelling evidence (such as land damage assessments and recurring events) that no other solution can reduce risk to acceptable or tolerable level at an acceptable cost.	Resilience of the land use has or will soon be exceeded beyond sustainable risk reduction measures, with continued use of the land no longer sustainable; and/or The coping capacity of a community, property or infrastructure has been exceeded, or will soon be exceeded; and/or Life safety and/or functionality of the building is threatened beyond risk reduction measures; and/or The consequential effects of the development on the environment will be irreversible. 'X' number of events leading to one or more of the points above have occurred in 'Y' years. Monitoring of the natural hazard and climate change risks is required to allow changes in risks to be managed.	Area being assessed will need to develop or use their risk tolerance thresholds based on local catchment characteristics. Area-specific coping capacity indicators will need to be developed. Availability of insurance e.g. is insurance retreat a possibility? Assessment of life safety is between 10^{-4} and 10^{-3} or greater per year (AIFR). Tolerance to risk needs to be assessed, monitored and reviewed over time.	Relocate from areas of intolerable risk. Prohibit future development that may increase the risk to life or property. Prohibit further intensification of existing uses. Investigate alternative land uses (if appropriate) that reduce risks to tolerable levels.

Table 2.2: Example of categories, criteria and risk thresholds for land use recovery planning.

Damage state	Category description	Category example	Criteria	Risk threshold	Metric
Minor damage	Repair to previous state.	Minor damage, no need for significant redesign/retrofitting. Private insurance is sufficient but uninsured may face hardship.	Risk to people and property is acceptable; activity can occur with limited repairs.	N/A	Assessment of life safety is less than 10^{-6} – 10^{-5} per year (AIFR).
Moderate damage - community interventions	Community-level interventions are effective in managing future risk.	Local government repairs and risk reduction initiatives adequate to manage future risk.	Risk is accepted only if the benefit gained from repairs and protection is shown to outweigh the risk (using the 'As Low As Reasonably Practicable' principle). Tolerable only if risk can be mitigated at a cost proportional to the benefit gained. Tolerability will have to be reassessed over time.	The sustainable use of the land can continue with cost-effective risk reduction measures; and Communities can cope with the impacts from natural hazard events. The life safety risk and/or functionality of the land use can be managed to safeguard the future of the land use.	Area being assessed will need to develop or use their risk tolerance thresholds based on local catchment characteristics. Area-specific coping capacity indicators will need to be developed. Availability of insurance e.g. is insurance retreat a possibility? Assessment of life safety is between 10^{-5} and 10^{-4} per year (AIFR).
Moderate damage - property interventions	Property-level interventions are needed to manage future risk, including in tandem with community level interventions Potential for significant further assessment required.	Property-specific measures such as improved drainage and raising houses is necessary. Benefits accrue to property owners, but some may face affordability issues. Interventions may be required/ possible but insufficient information to provide initial categorisation (these may subsequently move between "2" categories or to 1/3).			
Significant future risk	Future risk cannot be sufficiently mitigated. In some cases, some current land uses may remain acceptable, while for others there is an unacceptable risk of injury or death.	In the face of enhanced climate risks, the property may face unacceptable risk of future flooding. Other property could be subject to unstable land that poses an ongoing risk.	Impacted by event(s); and Imminent risk to life, and/or Land damage makes rebuild technically or economically infeasible; and/or Unacceptable future risk to assets (life, land, property, infrastructure etc) and compelling evidence (such as land damage assessments and recurring events such as repeated flooding) means that no other solution can reduce risk to acceptable or tolerable level at an acceptable cost.	Resilience of the land use has or will soon be exceeded beyond sustainable risk reduction measures, with continued use of the land no longer sustainable; and/or The coping capacity of a community or property has been exceeded, or will soon be exceeded; and/or Life safety and/or functionality of the building is threatened beyond risk reduction measures; and/or The consequential effects of the development on the environment will be irreversible. 'X' number of events leading to one or more of the points above have occurred in 'Y' years. Not just risk to life, other considerations need to be included for all assets at risk e.g. infrastructure, land and property. Monitoring of the natural hazard and climate change risks is required to allow changes in risks to be managed.	Area being assessed will need to develop or use their risk tolerance thresholds based on local catchment characteristics. Area specific coping capacity indicators will need to be developed. Availability of insurance e.g. is insurance retreat a possibility? Assessment of life safety is between 10^{-5} and 10^{-4} per year (AIFR). Tolerance to risk needs to be assessed, monitored and reviewed over time.

Natural Hazards Commission
Toka Tū Ake

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