ROTORUA DISTRICT PLAN

TE PŪRONGO WĀHANGA 32 MŌ TE PANONITANGA MAHERE TUAWARU E TŪTOHUTIA ANA - SECTION 32 REPORT FOR PROPOSED PLAN CHANGE 8 (NGĀ WHAKARITENGA MŌ NGĀ TŪRARU Ā-TAIAO- NATURAL HAZARDS)

June 2025

ROTORUA LAKES COUNCIL
Te Kaunihera o ngā Roto o Rotorua

Te Whakarāpopototanga Matua - Executive Summary

This report is prepared by Rotorua Lakes Council to support submissions and decision-making on Proposed Plan Change 8 (Natural Hazards) to the Rotorua District Plan, and to meet the plan change evaluation requirements under section 32 of the Resource Management Act 1991.

This plan change covers the strategic policies and objectives for all natural hazards, as well as the more detailed policies and methods to manage specific natural hazards: flooding; wildfire; fault rupture; land instability hazards relating to ground conditions (including liquefaction and soft, compressible soils) and slope stability; and geothermal hazards. The plan change considers the whole Rotorua District Plan in relation to the management of these hazards, including the Lakes A Zone. However, some matters, while related to natural hazards, are out of scope: stormwater management requirements for subdivision and development, vegetation disturbance provisions, management of the storage of hazardous substances and dam safety design.

Proposed changes to the District Plan and the reasons for the changes are detailed in this report. The proposed changes are also compiled, in full, in Appendix 1 and 2.

Key proposals in this plan change include:

1. **Strategic objectives and policies:**

   Replacing strategic objectives and policies to focus on acceptable risk, resilience to climate change and best practice principles for decision-making (SDNH-O1, SDNH-O2, SDNH-P1, SDNH-P2).

2. **Flooding:**

   a. Removing objectives applying only to the Waikato Region and instead relying on the amended strategic objectives for the whole district.
   b. Retaining flood hazard mapping outside the District Plan to enable consideration of the best available information in consenting decisions.
   c. Continued support for the two-pronged approach to manage building in flood-prone areas in policy NH-PA and NH-R4, which was developed under Plan Change 9. This involves minimum floor level standards in areas where anticipated flooding is less severe and the requirement for resource consent and a flood risk assessment for building in areas where anticipated flooding is more severe. Clarification through an amendment to Policy NH-PA, that resource consent can be declined if an acceptable level of risk is not demonstrated.
   d. A new rule for buildings and structures, and a new earthworks performance standard, to protect neighbouring land from changes in overland flowpaths in more intensely developed zones (NH-R5 and EW-S1(g)).
   e. Extending the existing and proposed policies and rules for managing flooding in the Natural Hazards Chapter to the Lakes A Zone.
   f. Adding natural hazards as a matter of discretion to existing restricted discretionary activity rules that require consent for buildings near waterbodies (NATC-R3(7) and (8)).

3. **Wildfire:**

   a. Inclusion of a definition of wildfire in the District Plan.
   b. Refining firefighting water supply standards in Rural Zones so they apply at land use, and not only subdivision, but limiting requirements to the more densely

populated Rural 2 Zone and Rural 3 Zone, and the Lakes A Zone's Settlement Management Area and Bush Settlement Management Area (RURZ-S5A, SUB-S9(3), Rule 34.0).

c. A new policy, which would also apply to the Lakes A Zone, to acknowledge the use of firefighting water supply to assist mitigate the risks of wildfire; and which also seeks to encourage (rather than require) further consideration and mitigation of wildfire through subdivision design in Rural Zones and at the urban-rural fringe (NH-P6).

4. Fault Rupture:

a. Removing the mapping of fault traces and the Fault Avoidance Overlay from the District Plan.
b. Retaining the existing rules (NH-R1 – NH-R3) for building in a Fault Avoidance Overlay but applying them to a new 'Fault Rupture Hazard Area', which is defined rather than a mapped overlay. Identification of this area would be supported by mapping outside the District Plan.
c. Adding a policy to the Natural Hazards chapter to acknowledge the management of fault rupture through land use rules and subdivision (NH-PAA).
d. Extending the policy and land use rules for fault rupture in the Natural Hazards chapter to the Lakes A Zone.

5. Land Stability (Ground Condition and Slope Stability) Hazards:

a. Removing soft soil and landslide susceptibility mapping from the District Plan.
b. Reducing the permitted volume, cut face and fill depth thresholds in the performance standards for permitted earthworks in Industrial Zones, Business and Innovation Zones, and the Rural 1 Zone (EW-S1(1)).
c. Reducing and clarifying the scope of the exceptions from the need to comply with earthworks performance standards for earthworks associated with subdivision and building platforms (EW-S1(4)).
d. Replacing Policy NH-P1 with a new policy to acknowledge assessment of land stability at subdivision, and applying this policy to the whole district, including the Lakes A Zone.

6. Geothermal Hazards:

a. Extending the requirement for assessment of geothermal hazards and mitigation options, which currently applies only to the Rotorua Geothermal System, to other geothermal systems (NH-R8).
b. Amending Rule NH-R8 to enable assessment, as a restricted discretionary activity, of geothermal hazard risks to new buildings and large additions exempt from the requirement to obtain building consent.
c. Amending the policy addressing the co-existence of Māori settlements with geothermal hazards so that it can apply more broadly across the district and directs consideration of this matter when considering whether risks are acceptable (NH-P3).
d. Extending geothermal rules and policies to the Lakes A Zone.

Te Ihirangi – Contents

1. Te Kupu Whakataki – Introduction

This report is prepared by Rotorua Lakes Council (RLC) to fulfil the statutory requirements of section 32 of the Resource Management Act 1991 (RMA) for Proposed Plan Change 8 – Natural Hazards (Plan Change 8, or the plan change). It sets out the scope of the plan change, describes the changes proposed, and provides RLC's evaluations of options and reasons for the proposed changes.

2. Ngā Whāinga me te Korahi o te Panonitanga ki te Mahere ā-Rohe – Objectives and Scope of the Plan Change

By progressing this plan change, RLC seeks to improve the management of natural hazards through the District Plan to promote resilience to natural hazards and the principles of the RMA and give effect to higher-order planning documents that guide the District Plan. At the same time, RLC also seeks to:

- Improve certainty for those undertaking development about how natural hazards are managed and the potential costs of management.
- Improve efficiency, where possible, to reduce costs to developers; and
- Promote fairness and equity by more targeting rules and costs, where possible.

The spatial scope of the plan change is the whole of the Rotorua District, including the Lakes A Zone.

The issues and strategic objectives reviewed in this plan change address natural hazards in general. However, the hazard-specific objectives, policies and methods, that is, the 'detail' of the plan change, is limited in scope to the following natural hazards:

1. Flooding;
2. Wildfire;
3. Fault rupture;
4. Ground condition hazards (including soft, compressible soils and liquefaction);
5. Slope stability; and
6. Geothermal hazards.

Policies and methods for volcanic hazards, although considered important in the Rotorua District, are not addressed in the current proposal due to the absence of hazard mapping and risk information and pending additional research planned by the Bay of Plenty Regional Council (BOPRC). Erosion is addressed only to the extent that it is related to slope stability; other issues associated with erosion, such as sedimentation and water quality, are not addressed.

Except as described below, the plan change is intended as a full review of the provisions relevant to the management of the above natural hazards. Specific issues have been identified to inform the development of the proposed changes, but it is anticipated that submissions may address other issues not yet identified.

The following matters, while relevant to natural hazards, are not within the scope of the current plan change:

1. **Stormwater management requirements for subdivisions and developments.**

   Stormwater management requirements are relevant to flooding but excluded from this plan change pending policy development alongside catchment management plans (which are required under conditions of the Comprehensive Stormwater Consent). Policy for stormwater management also needs to address other objectives in addition to natural hazards, which this plan change does not consider.

2. **Restrictions on vegetation disturbance**

   Restrictions on vegetation disturbance, while relevant to flooding, wildfire and slope stability, also need to address objectives other than for natural hazards, such as for protection of outstanding landscapes, natural character and water quality. RLC considers these cannot be reviewed adequately under its resourcing for Plan Change 8. This plan change does, however, propose to remove a policy so that natural hazard objectives and policies for wildfire can be considered alongside those for outstanding landscapes etc. when considering issues of revegetation.

3. **Management of the storage of hazardous substances**

   Sites prone to hazards present additional risks for storage of hazardous substances. However, this was not identified as a high priority for consideration with current resourcing and is left to a later review.

4. **Dam design**
   Dam design for safety is managed outside the district plan and this plan change. However, this plan change does consider a related issue of residual risk during high rainfall events from stopbank failure.

3. Te Horopaki ā -Ture, ā-Whakamahere hoki rā - Statutory and Planning Context

3.1 Resource Management Act 1991

3.1.1 RMA direction for District Plans

Under section 74, a territorial authority must prepare and change its district plan in accordance with its functions under the RMA. This includes the control of any actual or potential effects of the use, development, or protection of land, including for the purpose of the avoidance or mitigation of natural hazards (section 31(1)(b)(i)).

Natural hazards are defined as any atmospheric or earth or water related occurrence (including earthquake, tsunami, erosion, volcanic and geothermal activity, landslip, subsidence, sedimentation, wind, drought, fire, or flooding) the action of which adversely affects or may adversely affect human life, property, or other aspects of the environment (section 2).

Under section 74, a territorial authority must also prepare and changes its district plan in accordance with other specific matters, of which the following are most relevant to this plan change:

- the purpose and principles of the RMA, as set out in part 2 (see 3.1.2 below);
- its obligations to prepare an evaluation report in accordance with section 32 of the RMA (see 3.1.3 below);

It must also have regard to certain matters, including:

- the extent to which the district plan needs to be consistent with the plans or proposed plans of adjacent territorial authorities;
- any national adaptation plan (see 3.2.3 below).

Furthermore, it must take into account any relevant planning document recognised by an iwi authority and lodged with the territorial authority, to the extent to which its content has a bearing on the resource management issues of the district (see 3.4 below).

Section 75 further requires that a district plan give effect:

- to any national policy statement (see 3.2.1 below);
- a national planning standard (see 3.2.2 below); and
- any regional policy statement (see 3.3 below).

A District Plan must also not be inconsistent with a regional plan in respect of matters relating to the functions of a regional council.

Section 75 also sets out the mandatory content of district plan: being objectives, policies to implement the objectives, and rules (if any) to implement the policies. It also clarifies other content that can also be included.

3.1.2 Purpose and Principles of the RMA

Section 5 sets out the sustainable management purpose of the RMA, which means:

> *managing the use, development, and protection of natural and physical resources in a way, or at a rate, which enables people and communities to provide for their social, economic, and cultural well-being and for their health and safety while—*
>
> *a) sustaining the potential of natural and physical resources (excluding minerals) to meet the reasonably foreseeable needs of future generations; and*
> *b) safeguarding the life-supporting capacity of air, water, soil, and ecosystems; and*
> *c) avoiding, remedying, or mitigating any adverse effects of activities on the environment.*

Section 6 of the RMA states that, in achieving the purpose of this Act, all persons exercising functions and powers under it, in relation to managing the use, development, and protection of natural and physical resources, shall recognise and provide for specific matters of national importance, including 'the management of significant risks from natural hazards' (section 6(h)). The RMA does not currently define 'significant risks'. Consultation material for the development of a national policy statement proposes a definition based on a risk matrix, but this definition does not currently have legal effect (see section 3.2.1 below).

A further matter of national importance of relevance to this plan change is 'the relationship of Māori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, and other taonga' (section s(e)).

Section 8 requires that, in achieving the purpose of this Act, all persons exercising functions and powers under it, in relation to managing the use, development, and protection of natural and physical resources, shall take into account the principles of the Treaty of Waitangi (Te Tiriti o Waitangi).

3.1.3 Plan Change Evaluation (Section 32 Report)

Under section 32 of the RMA, RLC is required to undertake an evaluation prior to the notification of a plan change for submissions; and this report sets out RLC's response to this obligation. An evaluation under section 32 must (s32(1)):

a) *examine the extent to which the objectives of the proposal being evaluated are the most appropriate way to achieve the purpose of this Act; and*
b) *examine whether the provisions in the proposal are the most appropriate way to achieve the objectives by—*

   i) identifying other reasonably practicable options for achieving the objectives; and

   ii) assessing the efficiency and effectiveness of the provisions in achieving the objectives; and

   iii) summarising the reasons for deciding on the provisions; and

c) *contain a level of detail that corresponds to the scale and significance of the environmental, economic, social, and cultural effects that are anticipated from the implementation of the proposal.*

Under section 32(4), the 'objectives' in the context of this plan change are the proposed amended objectives of the District Plan relating to natural hazards.

The evaluation must also (section 32(2)):

a) *identify and assess the benefits and costs of the environmental, economic, social, and cultural effects that are anticipated from the implementation of the provisions, including the opportunities for—*

   i) economic growth that are anticipated to be provided or reduced; and

   ii) employment that are anticipated to be provided or reduced; and

b) *if practicable, quantify the benefits and costs referred to in paragraph (a); and*
c) *assess the risk of acting or not acting if there is uncertain or insufficient information about the subject matter of the provisions.*

3.2 National Direction

3.2.1 National Policy Statement for Natural Hazards

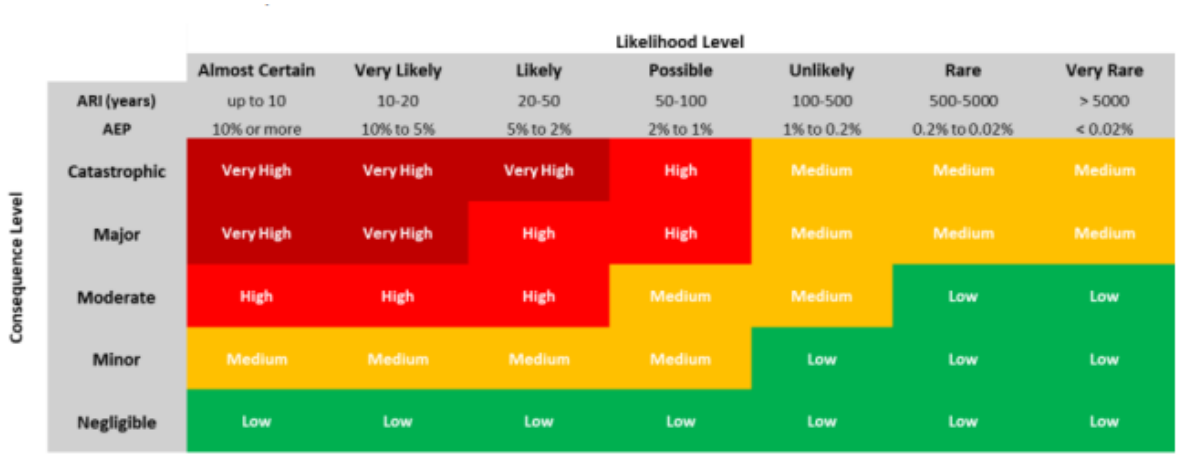
On 29 May 2025, the government released a consultation package on national direction under the RMA, which included a draft outline of content for a new National Policy Statement (NPS) for Natural Hazards. As this is only a consultation version, it does not have the status of a national policy statement, and therefore the requirement for district plans to 'give effect to' it under section 75(3) of the RMA does not apply. However, RLC may choose to consider the consultation material, as it provides an indication of potential future policy direction.

The NPS for Natural Hazards is signalled to apply only to specified natural hazards: flooding, landslips, coastal erosion, coastal inundation, active faults, liquefaction and tsunami. Key policy directions signalled in the consultation material include:

- A proposed definition of 'significant risk' (the management of which is a matter of national importance under section 6). This is defined as risk assessed as medium, high and very high

using a risk matrix that considers likelihood and consequences at a site level (refer to the figure and tables below).

- Objectives and policies that seek proportionate management, with land use controls proportionate to the level of natural hazard risk.
- A requirement to consider climate change impacts on natural hazards over a timeframe of at least 100 years.
- A requirement to use the best available information and to continue with risk assessment where information is uncertain or incomplete.
- A requirement that new subdivision, use and development, including mitigation measures, does not exacerbate significant natural hazard risk on other sites or locations.



Consequence Level	Likelihood Level						
	Almost Certain	Very Likely	Likely	Possible	Unlikely	Rare	Very Rare
ARI (years)	up to 10	10-20	20-50	50-100	100-500	500-5000	> 5000
AEP	10% or more	10% to 5%	5% to 2%	2% to 1%	1% to 0.2%	0.2% to 0.02%	< 0.02%
Catastrophic	Very High	Very High	Very High	High	Medium	Medium	Medium
Major	Very High	Very High	High	High	Medium	Medium	Medium
Moderate	High	High	High	Medium	Medium	Low	Low
Minor	Medium	Medium	Medium	Medium	Low	Low	Low
Negligible	Low	Low	Low	Low	Low	Low	Low

Note: Top end of likelihood range includes top end year, that is: Likely = over 20 years and up to and including 50 years.

Figure 1 - Risk Assessment Matrix from the Consultation Material for the NPS for Natural Hazards

Consequence Levels and Likelihoods Tables from the Consultation Material for the NPS for Natural Hazards

Consequence level	Damage to property	Potential for injury or fatalities
Catastrophic	Severe damage to land and buildings, potential for collapse or total destruction of structures. Building(s) need to be demolished, rebuilt or relocated.	High threat to life safety, with probable fatalities and/or critical injuries.
Major	Major damage to land and buildings, including structural damage. Loss of use and substantial repair required.	Unsafe for people, with potential for many injuries, or critical injuries and/or fatalities.
Moderate.	Some damage to land and non-structural damage to buildings. Limited loss of use, repairs required	Unsafe for people, with potential for injuries although expected to be minor.
Minor	Minor damage to land and buildings. No loss of use, minimal repairs required.	Isolated minor injuries possible.
Negligible	No loss of use, no building repairs required.	No injuries

Likelihood level	Annual exceedance probability (AEP)	Annual recurrence interval (ARI) or 'return period'
Almost certain	10% or more	Up to and including 10 years
Very likely	10% to 5%	Over 10 and up to and including 20 years
Likely	5% to 2%	Over 20 and up to and including 50 years
Possible	2% to 1%	Over 50 and up to and including 100 years
Unlikely	1% to 0.2%	Over 100 and up to and including 500 years
Rare	0.2% to 0.02%	Over 500 and up to and including 5,000 years
Very rare	Less than 0.02%	More than 5,000 years

At this stage, limited weight has been given to the consultation material. Nonetheless, the policy direction is considered well-aligned with the strategic objectives and policies proposed for the plan change. The 'risk' sections for each hazard in this report also include discussion about natural hazard risk with reference to the risk level framework in the consultation material to assist consider the policy direction for 'proportionate management' and to identify what would be 'significant risk' in terms of the consultation material.

3.2.2 National Planning Standards

The National Planning Standards came into effect on 5 April 2019. These codify the structure, mapping, definitions and noise/vibration metrics of District, Regional and Unitary Plans, and minimum requirements for an 'e'-Plan. Implementation of most of the requirements was due by April 2024.

Given the uncertainty regarding replacement of the RMA, RLC has undertaken a staged approach to implementation of the National Planning Standards and has already completed a major reformatting of the District Plan to achieve consistency with the general layout required and aligned rule drafting and some definitions.

However, some aspects have yet to be implemented; most significant is the alignment of the set of zones with the zone framework in the standards, alignment of some definitions and release of an 'e'-Plan. This plan change proposes to make some further progress in implementing the standards by extending the Natural Hazards chapter (which is consistent with the structure and formatting of the National Planning Standards) to the Lakes A Zone.

3.2.3 National Adaptation Plan

A National Adaptation Plan was adopted for New Zealand in 2022. Its table of actions was then amended in 2025 by the new Government. Relevant parts of the updated National Adaptation Plan for this plan change are summarised below:

1. **Risks to Buildings are identified as a Key Risk**

   Relevant to natural hazards and this plan change, risks to buildings, due to extreme weather events, drought, increased fire weather and ongoing sea level rise, are identified as one of ten significant risks Aotearoa will face from climate change to 2026.

   Relevant objectives include:

   HBP1: Homes and buildings are climate resilient and meet social and cultural needs

   HBP3: Māori connections to whenua and places of cultural value are strengthened through partnerships

2. **Risk-informed decision-making and resilient development are priorities**

   Also relevant to natural hazards and this plan change, the National Adaptation Plan identifies as priorities: enabling better risk-informed decisions; and ensuring planning and infrastructure investment decisions drive climate-resilient development in the right locations (page 14). It recognises that how and where we build needs to be considered on a case-by-case basis and avoidance is not always possible (page 65).

3. **Climate Change Scenarios**

   The National Adaptation Plan directs councils, when making or changing plans under the RMA, to use the following climate change scenarios, as a minimum (pages 68-69):

   - For screening hazards and risks in coastal areas, SSP8-8.5 or RCP8.5 to 2130 (no guidance is provided for screening hazards in non-coastal areas).
   - For detailed hazard and risk assessments, both middle of the road (SSP2-4.5 or RCP4.5) and fossil fuel intensive scenarios (SSP5-8.5 or RCP 8.5).

   It also promotes stress testing of plans, policies and strategies using a range of scenarios.

   RLC acknowledges this guidance but also considers that hazard mapping is a process of continued improvement. It considers that the absence of the recommended scenarios should not be a reason to delay consideration of this plan change to improve management of natural hazards.

4. **Nature-Based Solutions and Resilient Infrastructure**
   The National Adaptation Plan encourages planning approaches that incorporate natural systems and enhance the resilience of infrastructure. District-level rules that support setback areas from geothermal hazards and streams align with this goal.

3.3 Regional Policy Statements

The Rotorua District straddles the Waikato Region and Bay of Plenty Region and is, therefore, subject to two regional policy statements and the regional plans of both regional councils. The documents of each region have their own approach and language, which creates complexity for developing district plan objectives and policies that are consistent with higher-level planning documents, while also concise and easy to understand.

Regional plan provisions that guide this plan change are set out below. Additional, hazard-specific provisions are also discussed under the relevant hazard sections of this report.

3.3.1 Waikato Regional Policy Statement

The Waikato Regional Policy Statement (WRPS) became operative in May 2016.

Objective **HAZ-O1** provides the overarching objective for natural hazards:

> *The effects of natural hazards on people, property and the environment are managed by:*
>
> 1. *increasing community resilience to hazard risks;*
> 2. *reducing the risks from hazards to acceptable or tolerable levels; and*
> 3. *enabling the effective and efficient response and recovery from natural hazard events.*

Interpretation defines risk and levels of risk at a conceptual level:

The probability or likelihood of specified negative consequence to life, well-being, property, economic activity, environmental or other specified values, due to a particular hazard or group of hazards.

Three levels of risk are identified:

- *Intolerable: risk which cannot be justified and risk reduction is essential e.g. residential housing being developed in a primary hazard zone;*
- *Tolerable: risk within a range that a community can live with so as to secure certain net benefits. It is a range of risk that is not regarded as negligible or as something to ignore, but rather as something to be kept under review and reduced if possible; and*
- *Acceptable: risk which is minor, and the cost of further reducing risk is largely disproportionate to the benefits gained e.g. residential housing being developed beyond coastal setbacks.*

Policy HAZ-P1 sets out the natural hazard risk management approach:

Natural hazard risks are managed using an integrated and holistic approach that:

1. *ensures the risk from natural hazards does not exceed an acceptable level;*
2. *protects health and safety;*
3. *avoids the creation of new intolerable risk;*
4. *reduces intolerable risk to tolerable or acceptable levels;*
5. *enhances community resilience;*
6. *is aligned with civil defence approaches;*
7. *prefers the use of natural features over manmade structures as defences against natural hazards;*
8. *recognises natural systems and takes a 'whole of system' approach; and*
9. *seeks to use the best available information/best practice.*

Policy HAZ-P2 provides direction on managing subdivision and land use to reduce the risks from natural hazards:

Subdivision, use and development are managed to reduce the risks from natural hazards to an acceptable or tolerable level including by:

1. *ensuring risk is assessed for proposed activities on land subject to natural hazards;*
2. *reducing the risks associated with existing use and development where these risks are intolerable;*
3. *avoiding intolerable risk in any new use or development in areas subject to natural hazards;*
4. *minimising any increase in vulnerability due to residual risk;*
5. *avoiding the need or demand for new structural protection works; and*
6. *discouraging hard protection structures and promoting the use of alternatives to them, including natural defences in the coastal environment.*

Policy HAZ-P3 addresses high impact, low probability natural hazard events:

The risks associated with high impact, low probability natural hazard events such as tsunami, volcanic eruptions, earthquakes and debris flows are considered, having particular regard to:

1. *personal health and safety;*
2. *damage and/or disruption to essential community services;*
3. *the ability of a community to respond and recover; and*

4. *civil defence readiness, response and recovery planning*.

Objective IM-O5 addresses climate change:

> *Land use is managed to:*
>
> 1. *avoid the potential adverse effects of climate change induced weather variability and sea level rise on:*
>
> a. *amenity;*
> b. *the built environment, including infrastructure;*
> c. *indigenous biodiversity;*
> d. *natural character;*
> e. *public health and safety; and*
> f. *public access.*
>
> 2. *support reductions in greenhouse gas emissions within urban environments and ensure urban environments are resilient to the current and future effects of climate change*

3.3.2 Bay of Plenty Regional Policy Statement

The natural hazards provisions of the Bay of Plenty Regional Policy Statement (BOPRPS) were introduced by Change 2 and became operative in July 2016.

Objective 31 provides the overarching objective for natural hazards:

> *Avoidance or mitigation of natural hazards by managing risk for people's safety and the protection of property and lifeline utilities*

Policy NH 1B requires a risk management approach to natural hazards:

> *Take a risk management approach to control the use, development and protection of land to avoid or mitigate natural hazards by assessing the level of risk according to the likelihood of natural hazards occurring and their potential consequences.*

Policy NH 2B seeks that, in taking this risk management approach, natural hazard risk is classified into three levels. As further explained below, the default risk classification method in Appendix L is at a 'hazard zone scale' but Appendix L also leaves open other recognised risk assessment methodologies included in regional or district plans, which could be at different scales:

> *Classify risk according to the following three category risk management framework as detailed in Appendix L:*
>
> 1. *High natural hazard risk being a level of risk beyond what should be tolerated.*
> 2. *Medium natural hazard risk being a level of risk that exceeds the Low level but does not meet the criteria for High risk.*
> 3. *Low natural hazard risk being the level of risk generally acceptable.*
>
> *The policy direction associated with these levels of risk is set out in Policy NH 3B Natural hazard risk outcomes.*

Policy NH 4B addresses the risk objectives at the development scale. This policy is key for this plan change, which seeks to ensure development is appropriately managed.

> *Require a Low natural hazard risk to be achieved on development sites after completion of the development (without increasing risk outside of the development site) by controlling the form, density and design of:*

a. G*reenfield development;*

b. *Any urban activity within the existing urban area that involves the construction of new and/or additional buildings or reconstruction of or addition to existing buildings (including any subdivision associated with such activities); and*

c. *Rural lifestyle activities;*

except that a Low level of risk is not required to be achieved on the development site after completion of the development where the development site is located within a natural hazard zone of Low natural hazard risk and that natural hazard zone will maintain a Low level of natural hazard risk after completion of the development.

Unlike policy NH 3B below, this policy does not reference Appendix L and no methodology for assessing risk at the development scale is provided.

Policy NH 3B sets out the risk outcomes sought at the 'hazard zone' scale:

By the application of Policies NH 4B and NH 12A, achieve the following natural hazard risk outcomes at the natural hazard zone scale:*

a. *In natural hazard zones subject to High natural hazard risk reduce the level of risk from natural hazards to Medium levels (and lower if reasonably practicable); and*

b. *In natural hazard zones subject to Medium natural hazard risk reduce the level of risk from natural hazards to be as low as reasonably practicable; and*

c. *In natural hazard zones subject to Low natural hazard risk maintain the level of risk within the Low natural hazard risk range.*

**This risk outcome specific to new development on specific development sites is set out in Policy NH 4B.*

This policy (and the corresponding analysis of risk at the 'hazard zone' scale according to the default methodology in Appendix L) is potentially of less relevance to this plan change than Policy NH 4B, since this plan change seeks to amend provisions for new development on specific development sites. Nonetheless, 'hazard zone' scale analysis assists to provide an overall indication of the significance of the risks, in terms of section 7 of the RMA, and therefore their priority for management.

Appendix L sets out the method for classifying risk. The default methodology requires assessment of probability and consequences using a specified list of consequence types or metrics considered at a hazard assessment area scale. The user guide published by BOPRC clarifies that a hazard assessment area is a natural hazard zone, which in turn, is either part of, or the whole area, considered susceptible to the hazard (Bay of Plenty Regional Council, undated).

The default methodology for assessing risk also requires the use of average annual individual fatality risk within the assessment area as a secondary metric to confirm the risk level. This requires estimation of the average annual number of fatalities in the assessment area, divided by the total number of people present in the hazard zone (this is also calculated separately for people in care). As with the primary analysis, this metric is highly dependent on the extent of the chosen hazard assessment area.

Appendix L also supports alternative methods of risk assessment that are included in regional, city or district plans or recognised in the consideration of resource consent applications. This may include risk assessment methodologies incorporated in regulations or industry codes of practice.

Policy NH 13C sets out the responsibilities for undertaking the assessments to classify risk, as well as for the hazard susceptibility mapping on which the risk assessments are based:

- *Regional council has responsibility for most of the susceptibility mapping with the exception of urban flooding and landslip/debris flows caused by extreme rain, which is the responsibility of city and district councils.*
- *Regional council is responsible for risk assessments for hazards relating to volcanic hazards, liquefaction and tsunami; city and district councils are responsible for risk assessments for fault rupture, landslides and flooding.*

Policy NH 12A sets out how the risk outcomes at the 'hazard zone' scale are to be achieved:

> *Promote the natural hazard risk outcomes set out in Policy NH 3B by:*
>
> *a. Providing for plans to take into account natural hazard risk reduction measures including, where practicable, to existing land use activities, and, where necessary.*
> *b. Controlling the location, scale and density of the subdivision, use, development and protection of land and land use change in city, district and regional plans.*
> *c. Ensuring that regional, city and district plan provisions provide a high degree of certainty for the establishing and maintaining of essential risk reduction works and other measures.*

Policy IR 2B requires regard to the effects of climate change:

> *Recognise and provide for the predicted effects of climate change having particular regard to:*
>
> *d. Predicted increase in rainfall intensity, taking account of the most recent national guidance and assuming a minimum increase in the annual mean temperature of 2°C by 2090 (relative to 1990 levels); and*
> *e. Predicted increase in sea level, taking into account the most recent national guidance and the minimum sea-level rise projections in Policy NH 11B.*

3.4 Iwi Management Plans

The following iwi management plans have been considered in the development of this plan change:

- *He Mahere Putahitanga: A pan tribal Iwi Planning Document on behalf of the Central North Island Forests Collective (2018).*
- *The Ngāti Tahu – Ngāti Whaoa Iwi Environmental Management Plan, Rising Above the Mist – Te Aranga Ake I te Taimahatanga.*
- *Te Mahere ā Rohe mō Ngāti Rangitihi, the Ngāti Rangitihi Iwi Evironmental Management Plan (2011).*
- *Te Rautaki Taiao a Raukawa, the Raukawa Environmental Plan (2015).*
- *Tapuika Environmental Management Plan (2014-2024).*
- *Ngāti Kea Ngāti Tuara Iwi Environmental Management Plan (2016).*
- *Te Pūkenga Kaumātua o Ngāti Pikiao Ngā Tīkanga Whakahaere Taonga o Ngāti Pikiao Whānui (1997).*
- *Te Tūāpapa o ngā Wai o Te Arawa, the Te Arawa Cultural Values Framework with He Mahere Taiao mo nga Wai o Te Arawa, the Te Arawa Lakes Environmental Plan (2015 updated 2019)*
- *Ngāti Rangiwewehi Iwi Environmental Management Plan (2012).*
- *Tūhourangi Tribal Authority Enhanced Iwi Environmental Resource Management Plan (2011).*

- *Whakamarohitia ngā wai o Waikato, Te Arawa River Iwi Trust Environmental Plan (2021).*
- *Te Taiao o Te Whatuoranganuku – the Environmental Resources of Te Whatuoranganuku (Ngāti Tamateatutahi-Ngāti Kawiti Hapu Environmental Management Plan) (2015).*

Natural hazards and/or climate change are specifically addressed in several iwi management plans as summarised below:

1. ***Te Mahere ā Rohe mō Ngāti Rangitihi, the Ngāti Rangitihi Iwi Evironmental Management Plan.***

   This management plan seeks that the adverse effects from natural hazards on human life, property and the environment are avoided, remedied or mitigated, while also minimising the adverse effects of measures implemented to reduce the risks of natural hazards. In relation to flooding, policies also seek that developments demonstrate they will not worsen inundation or can mitigate the effects.

   This is considered consistent with the objectives of this plan change.

2. ***Te Tūāpapa o ngā Wai o Te Arawa, the Te Arawa Cultural Values Framework with He Mahere Taiao mo nga Wai o Te Arawa, the Te Arawa Lakes Environmental Plan***

   The section on natural hazards and the changing climate regarding the Te Arawa lakes addresses issues of relevance to land use planning, such as recognition that warming air temperatures may lead to more extreme weather events, more frequent flooding and an increased risk of lake erosion. These issues are also recognised in this plan change.

   The plan also notes that numerous marae and wāhi tapu are located next to the lakes. It seeks recognition and valuing of Te Arawa intergenerational knowledge and experience living with natural hazards.

3. **Te Rautaki Taiao a Raukawa, the Raukawa Environmental Plan.**

   Relevant to this plan change, the management plan seeks that:

   - flood hazards are identified and avoided or mitigated in any intensification of land use, which is consistent with the objectives of this plan change.
   - A precautionary approach is taken in avoiding, remedying or mitigating the adverse effects on development of earthquakes, volcanic activity, and climate change.

4. **Ngāti Rangiwewehi Iwi Environmental Management Plan**

   This plan discusses work that the iwi have been doing to understand natural hazard and climate change risks in Awahou village.

A theme identified in several iwi management plans to guide the development of this plan change is the importance for iwi of living in geothermal areas and accessing geothermal resources, including for economic ventures. For example,

- *The Ngāti Tahu – Ngāti Whaoa Iwi Environmental Management Plan, 'Rising Above the Mist – Te Aranga Ake I te Taimahatanga'* states:

  > *Geothermal areas were favoured by our tūpuna for settlements, providing precious warmth and hot bathing, natural cooking and preserving, and sites for ritual purposes and healing.*

The plan also explains that Ōrakei Kōrako, before the construction of the Ōhakuri dam, was a principal settlement for centuries and the ūkaipō – the first traditional settlement of before. The iwi seeks to be able to freely access traditional ngāwhā. Geothermal areas also support iwi tourism ventures.

- *Te Rautaki Taiao a Raukawa, the Raukawa Environmental Plan* has a vision that:

  Raukawa express our traditional relationships with geothermal sites and the role of hapū as mana whenua and kaitiaki is expressed in meaningful ways, including giving expression to our rights and interests. RCT is actively involved in national, regional, and local geothermal policy, strategy, and management. Opportunities associated with geothermal resources to provide employment, economic ventures, education, and ongoing connection are actively pursued.

  It seeks that Local authorities actively provide for the traditional and customary geothermal resources in reserve plans, regional plans,and resource consent processing.

- *Te Taiao o Te Whatuoranganuku – the Environmental Resources of Te Whatuoranganuku (Ngāti Tamateatutahi-Ngāti Kawiti Hapu Environmental Management Plan)* recounts how their people tended to spend winter on the Waitangi Block with the ngawha Waitangi (also known as the Soda Springs). By then, crops were harvested and stored, fish and birds were cured or dried and it was a time to relax and think about the future. Waitangi was ideal in this respect as the people observed the stars as they bathed.

This plan change seeks to support this this theme in the District Plan (refer to section 11.8.4 of the report).

The importance of facilitating papakāinga housing is another relevant theme, for example:

- *Ngā Tīkanga Whakahaere Taonga o Ngāti Pikiao Whānui* states:

  Māori multiple owned land is often not able to be utilised to its full potential because of the nature of the tenure and because of planning constraints. Māori want to live on their ancestral land. Māori should therefore be able to use their land as they see fit, so long as each proposal is consistent with the sustainable management of natural and physical resources. It should therefore be a matter of right for Māori to use multiply owned land for housing purposes such as Papakāinga.

Protection of opportunities to enhance wellbeing associated with Māori land and treaty settlement land is another theme, for example:

- The Central North Island Forests Iwi Collective stresses that planning places unfair constraints on development of treaty settlement land, favouring land that is already developed.
- *The Tapuika Environmental Management Plan* notes as an issue that there are opportunities to enhance Tapuika wellbeing associated with Māori land, commercial redress areas and cultural redress sites and seeks to enable the development and use of Māori land for the benefit of its owners, their whānau, hapū and Iwi.

This concern is acknowledged. However, in the context of natural hazard management, it is considered appropriate to strengthen the management of natural hazard risks in response to evolving information and the effects of climate change. This can mean that new development is subject to higher design expectations.

4. Te Tukanga Panoni i te Mahere ā-Rohe - Plan Change Development Process

In summary, this plan change proposal was developed through the following overlapping steps:

1. Review of natural hazards literature relating to the Rotorua district.
2. Notice to iwi of the intention to develop a plan change and its potential scope, and invitation for discussion.
3. Review of iwi management plans, regional policy statements, the national adaptation plan, national guidance and the district plans of territorial authorities, including neighbouring territorial authorities.
4. Interviews with technical experts, regional councils, local planners, land-development engineers, and geo-professionals.
5. Development of an options paper to aid further discussion with and feedback from the above technical experts.
6. Workshops on flooding and wildfire with RLC staff, technical advisors and technical experts from other councils.
7. Circulation of a draft section 32 report to iwi for feedback, invitation for discussion, and a follow up meeting with an iwi authority.

5. Te Ahunga Rautaki – Strategic Direction

5.1 Current District Plan Strategic Direction

The objectives and policies for all natural hazards (for areas outside the Lakes A Zone) sit in the SDNH Natural Hazards and Climate Change Resilience chapter of the Strategic Direction section of Part 1 of the District Plan, and are as follows:

> ***SDNH-O1:*** *Minimise or reduce the level of risk to life, property and the environment from the subdivision, use and development of land in areas subject to a natural hazard.*
>
> ***SDNH-P1:*** *Require the design and location of activities to avoid or mitigate natural hazards to an acceptable level of risk to life, property and the environment.*
>
> ***SDNH-P2:*** *Recognise that the risk of natural hazards will continue to influence the nature and location of urban development*

The issue statement, which informs the identification of these objectives and policies is as follows:

> ***SDNH-I1 Natural hazards***
>
> *A secure and safe community is a healthy community and will attract growth. Our district has learned to safely take advantage of natural hazards. The oldest settlements in our district are within active geothermal systems where surface and underground features present a potential hazard to building and living. The district is subject to a number of natural hazards that can adversely affect life or property. The main natural hazards affecting the district are earthquakes (associated with fault lines), subsidence (including liquefaction), landslides, flooding, and volcanic and geothermal activity due to the district's location within the Taupō Volcanic Zone. A lesser-known source of volcano hazard is 'Caldera Unrest'. There is uncertainty over when the activity increases from 'background' levels to 'volcanic unrest' and an eruption threat. The Bay*

of Plenty and Waikato Civil Defence Emergency Management Group Plans rank caldera unrest as the 4th and 3rd highest hazard respectively. Some areas known to be at risk from actual or potential hazards such as subsidence, flooding and geothermal activity have already been developed for urban purposes. In addition some hazards such as volcanic activity and earthquakes are more difficult to identify and mitigate in advance and the potential effects of the hazards themselves are so widespread and devastating that avoidance or control through the District Plan is not always possible. The District Plan specifically manages land use affected by natural hazard risks through fault line rules and performance standards relating to flooding, geothermal activity and fault lines where appropriate mitigation measures are available, and are not sufficiently managed under other national legislation such as the Building Act 2004. All natural hazards identified on the planning maps will be addressed when considering resource consent applications, guided by the natural hazard provisions of this part of the plan

For the Lakes A Zone, Objective 18 broadly addresses natural hazards as follows:

> *Limited risks to human occupation and activity caused by the risks posed by natural hazards including:*
> *Flooding (river and lake fluctuations);*
> *Ōkataina volcanic centre and localised volcanism;*
> *Geothermal activity;*
> *Seismic activity in active fault lines;*
> *Fires.*

Policy 13.1 in the Lakes A Zone also broadly addresses natural hazards:

> *To recognise that hazards arise from volcanic activity, seismic activity, geothermal activity, flooding, fire, erosion and sedimentation and apply measures that reduce risk to people and property.*

The issue statement in the Lakes A Zone is as follows:

> **S1.1.13 Natural Hazards**
>
> *The lakes environment will continue to be at risk from volcanic and seismic activity and in some local areas stormwater overland flow paths.*

5.2 Proposed Changes to Strategic Objectives, Policies and AERs

It is proposed to amend SDNH-O1, as set out below, to embed a risk-based approach to the management of natural hazards, consistent with the direction in the regional policy statements:

> *SDNH-O1: The risks from natural hazards to people, property and the environment associated with land use, subdivision and development are acceptable. ~~Minimise or reduce the level of risk to life, property and the environment from the subdivision, use and development of land in areas subject to a natural hazard.~~*

A definition of acceptable risk is also proposed as follows, which is considered also to resolve the concept of 'tolerable risk', which is a feature of the WRPS but not of the BOPRPS:

acceptable risk	*risk that is low, and the costs of further reducing risk are largely disproportionate to the benefits gained.*

An additional strategic objective is also proposed, as follows, to address resilience to climate change:

> *SDNH-O2: Land use, subdivision and development are resilient to the current and future effects of climate change.*

Two policies are proposed to replace the existing two. The proposed policies are intended to set out key best practice principles for managing natural hazards identified through literature review and consultation.

> ~~*SDNH-P1: Require the design and location of activities to avoid or mitigate natural hazards to an acceptable level of risk to life, property and the environment.*~~
>
> ~~*SDNH-P2: Recognise that the risk of natural hazards will continue to influence the nature and location of urban development*~~
>
> *SDNH-P1: When assessing whether the natural hazard risks associated with subdivision or land use are acceptable, and identifying risks that must be avoided or mitigated:*
>
> 1. *Assess the likelihood and potential consequences of natural hazards affecting the land and any potential to exacerbate risks beyond the site.*
> 2. *Use the best available information, including relevant national and regional guidance.*
> 3. *Take into account:*
>   a. *The predicted effects of climate change, applying a precautionary approach where the extent of the impact is uncertain.*
>   b. *Cumulative effects over time and across multiple activities.*
>   c. *Residual risk, including the potential failure of structural hazard defences.*
>   d. *For developments undertaken by tangata whenua, the cultural significance of the site or activity, which may justify acceptance of a higher level of natural hazard risk.*
> 4. *Promote opportunities to reduce existing natural hazard risks affecting established land uses.*
>
> *SDNH-P2: Strengthen, maintain and protect natural systems and features (such as wetlands and floodplains) that contribute to reducing the risks natural hazards and the effects of climate change.*

An assessment of the replacement of Policy SDNH-P1 and SDNH-P2 is provided below:

	Option 1: Retain existing Policy SDNH-P1 and Policy SDNH-P2	Option 2: Replace Policy SDNH-P1 and Policy SDNH-P2 as set out above
Relevant Objectives (as proposed to be amended)	*SDNH-O1: The risks from natural hazards to people, property and the environment associated with land use, subdivision and development are acceptable* *SDNH-O2: Land use, subdivision and development is resilient to the current and future effects of climate change*	
Efficiency and Effectiveness of Achieving Objectives	Existing policies align with the objectives in a general way but not provide the same level of support to	The proposed policies are clearly aligned with the proposed objectives. They promote best practice by embedding a risk-based assessment framework incorporating consideration of climate change,

	a risk-based approach or address climate change resilience. Existing Policy SDNH-P1 essentially repeats proposed objective SDNH-O1 and is no longer necessary.	cultural values, residual risks and cumulative risks.
Costs and Benefits	Is less aligned with iwi feedback.	Provides principles for decision-making to promote consistency. Responds to feedback from iwi about the need to recognise cultural values in decisions about whether and how to manage natural hazards.
Risks of acting or not acting if insufficient information		Natural hazard risks are inherently uncertain. The proposed policy provides guidance for addressing this, including the use of national and regional guidance and the precautionary principle.
Conclusion	Option 1 is considered the least appropriate.	Option 2 is considered the most appropriate.

The anticipated environmental result (AER)in the Strategic Direction section and the equivalent AER in the Natural Hazards chapter (NH) are proposed to be amended as follows:

> ~~*Enhanced public safety in relation to natural hazards through*~~ *The design and management of land use activities and subdivision to an acceptable level of risk.*

It is also proposed that the new strategic objectives and policies of the main part of the District Plan be extended to the Lakes A Zone. This will be implemented by a note at the beginning of the SDNH Strategic Direction – Natural Hazards and Climate Change Resilience chapter and cross-references in the Lakes A Zone issues (S1.1) and introduction to the objectives, policy areas and rule management areas (S3.1).

It is further proposed to limit Objective 18 of the Lakes A Zone to volcanic hazards, as this is not addressed in this plan change. Similarly, Policy 13.1 is proposed to be limited to volcanic hazards, as well as erosion and sedimentation since erosion is only considered in the context of its contribution to slope stability hazards.

> *Objective 18: Limited risks to human occupation and activity caused by the risks posed by* ~~*natural hazards including*~~*:*
> ~~*Flooding (river and lake fluctuations);*~~
> *Ōkataina volcanic centre and localised volcanism;*
> ~~*Geothermal activity;*~~
> ~~*Seismic activity in active fault lines;*~~
> ~~*Fires.*~~
>
> *Policy 13.1 To recognise that hazards arise from volcanic activity,* ~~*seismic activity, geothermal activity, flooding, fire,*~~ *erosion and sedimentation and apply measures that reduce risk to people and property.*

As a consequence to limiting the objectives and policies, it is also proposed to amend the explanation and principal reasons for natural hazards in S5.13 as follows:

> *There is a wide range of possible natural hazards and some created hazards that constrain*

development. ~~The lakes area has a significantly large number of faultlines, the avoidance of which by development, would be impossible~~. As such, Council's approach is to keep development at a relatively low density, to apply the provisions of the Building Act 1991 and implement evacuation procedures rather than prohibit further development in the area. It is not considered practical to avoid the effects of ~~earthquake and~~ volcanic eruptions other than timely evacuation.

~~Council is managing stormwater effects and mitigating flood hazards. The risk of fire hazard from allowing built development in bush environments is acknowledged. However, those choosing to live in such vegetated environments must live with this risk in the context of a largely undeveloped landform covered in indigenous vegetation.~~

5.3 Proposed Changes to Issue Statements

It is proposed to replace the issue statements in the main part of the District Plan (SDNH-I1) and Lakes A Zone (S1.1.13) with the following:

The [Rotorua District/lakes environment] is exposed to a range of natural hazards due to its location within the Taupō Volcanic Centre, and its unique geography, geology, and climate. These hazards include flooding, geothermal activity, slope stability hazards, ground condition hazards (including liquefaction and soft, compressible soils), fault rupture and volcanic hazards, such as caldera unrest. These events pose risks to people, property, infrastructure, and the natural environment.

Climate change is expected to increase the frequency and severity of some natural hazards, particularly flooding, slope stability, and wildfire. Subdivision and land use activities influence the vulnerability and exposure of individuals and communities to these risks. Some areas known to be at high risk have already been intensively developed, resulting in expectations of continued development and increasing the potential consequences of hazard events.

In some cases, occupation of hazard-prone areas may reflect important cultural values, social or economic values. For example, geothermal areas have traditionally been favoured by Māori for settlement and cultural use. Similarly, lakeside areas that are susceptible to flooding are often valued for recreation, tourism and residential living, contributing to community identity.

Effective management of natural hazard risk is often challenged by limitations in available information, including uncertainty around hazard extent, frequency, and potential impacts.

6. Te Waipuke – Flooding

6.1 Scope of Plan Change for Flooding and Summary of Proposed Changes

Plan Change 8 is intended to provide an opportunity for a review of all flood management provisions of the District Plan, except for the following, which are out of scope:

- Stormwater management requirements for subdivision and development, including on-site attenuation or retention requirements.
- Storage of hazardous substances.

Flooding provisions were only recently subject to significant change under Plan Change 9, which included clarification of design standards for floor levels and a new requirement for a flood risk assessment (as a restricted discretionary activity) in areas where flood depths are anticipated to be more severe. Further changes are now proposed to continue to strengthen flood management although the District Plan and clarify practice. Key proposals are:

- Removing objectives applying only to the Waikato Region and instead relying on the amended strategic objectives for all natural hazards.
- Continued support for the two-pronged approach to manage building in flood-prone areas in policy NH-PA and NH-R4, which was developed under a previous plan change. This involves minimum floor level standards in areas in areas where the anticipated flooding is less severe and a requirement for resource consent and a flood risk assessment when building in areas where anticipated flooding is more severe. However, clarification through an amendment to Policy NH-PA(2), that resource consent can be declined if an acceptable level of risk is not demonstrated.
- In more intensely developed zones, a new rule for buildings / structures and earthworks performance standard to protect neighbouring land from changes in overland flowpaths caused by these activities (NH-R5, EW-S1(g) and Rule 5.0 in the Lakes A Zone).
- Extending the existing and proposed policies and rules for managing flooding in the Natural Hazards chapter to the Lakes A Zone.
- Adding natural hazards as a matter of discretion to existing restricted discretionary activity rules that require consent for buildings near specific waterbodies (NATC-R3(7) and (8)).

Further detail on the proposed changes, as well as background information and an evaluation of the changes, is provided in the following sections of the report.

6.2 Flood Hazards Affecting the Rotorua District

Three main types of flood hazards affect the Rotorua District:

1. **High lake levels**

   High lake levels following prolonged wet weather can cause flooding, such as those experienced around Lake Rotomā and Lake Rotoehu in 2023.

2. **River/stream (fluvial) flooding**

   High rainfall events can cause water levels in rivers/streams to rise to levels that exceed the capacity of their channels, spilling floodwaters onto adjacent land. A recent example was the overtopping of the Ngongotahā Stream in 2018.

3. **Surface (pluvial) flooding**

   During high rainfall surface flooding and ponding can occur when the rate of rainfall exceeds the rate at which water can infiltrate the soil and/or be conveyed through drainage networks, so excess water accumulates on the surface. This type of hazard can affect areas that are not located near a lake, river or stream.

Climate change is expected to increase river/stream (fluvial) and surface (pluvial) flooding, due to more extreme weather. The key finding in the guidance funded by the Ministry for the Environment, which distilled and interpreted information relevant to New Zealand from '*The Physical Science Basis*' report to the Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment (2021), was (Bodeker, 2022):

> *There is medium confidence that river flooding will increase in New Zealand. Projections for New Zealand indicate that the 1-in-50 year and 1-in-100-year flood peaks for rivers in many parts of the country may increase by 5 to 10% by 2050 and more by 2100 (with large variation between models and emissions scenarios), with a corresponding decrease in return periods for specific flood levels.*

We understand that BOPRC will soon release guidance on the effect of climate change on high lake levels. In the interim, it has suggested that climate change might not influence lake flooding hazards as much as other flood hazards. This is because lake levels are affected by long-duration climatic periods, which are less impacted by climate change (Bay of Plenty Regional Council, 2022).

Flood hazards have been, or are being, mapped in various studies, as summarised below:

- BOPRC has produced high lake level projections for the major lakes of the district. These projections have been transformed into maps of affected land by RLC using a simple 'bathtub' elevation approach, and the maps are available on RLC's online mapping viewer *Geyserview*. Indicative climate change adjustments to the 1% annual exceedance probability (AEP) lake levels have been included for larger lakes in Geyserview, as an interim approach until the climate-adjusted forecasts are published by BOPRC.
- RLC has commissioned catchment (pluvial and fluvial) flood modelling for present and future climate scenarios for most of the Rotorua city urban catchments and the wider Ngongotahā area (with gaps remaining to the east near Rotorua Airport and Hannahs Bay) and is continuing to update these models and fill in gaps in coverage.
- BOPRC has commissioned river and stream (fluvial) flood modelling of the greater Utuhina catchment for present and future climate scenarios.
- It is understood that a national flood model and regional flood model for Waikato are also underway. These are expected to produce flood hazard mapping covering much of the district, although of a lesser quality than the modelling commissioned for the urban area.
- RLC is developing a GIS-based analysis of overland flowpaths and areas vulnerable to stormwater blockages. Initial comparison to urban catchment modelling suggests most flowpaths and possible detention areas vulnerable to stormwater blockages overlap with those identified in the catchment models but some additional areas are also affected.

Figure 2 shows urban areas of Rotorua within the modelled flood extents for the 1%AEP RCP 8.5 event from RLC's catchment models. Figure 3 shows areas within the modelled flood extents for the 1%AEP RCP 8.5 event for a future climate (2130 for Ngongotahā and the western city and 2100 for the eastern city).

Figures 4 and 5 are examples of high lake level mapping for lakes in the district (with Lake Rotorua also including an interim allowance for climate change pending further information from BOPRC).

Modelling outputs for the western city and Ngongotahā also include 'hazard classes', as illustrated in Figure 6. These classes are based on maximum depth and velocity and the Australian classification system (AIDR, 2017). RLC plans to expand hazard class mapping to other urban catchments.

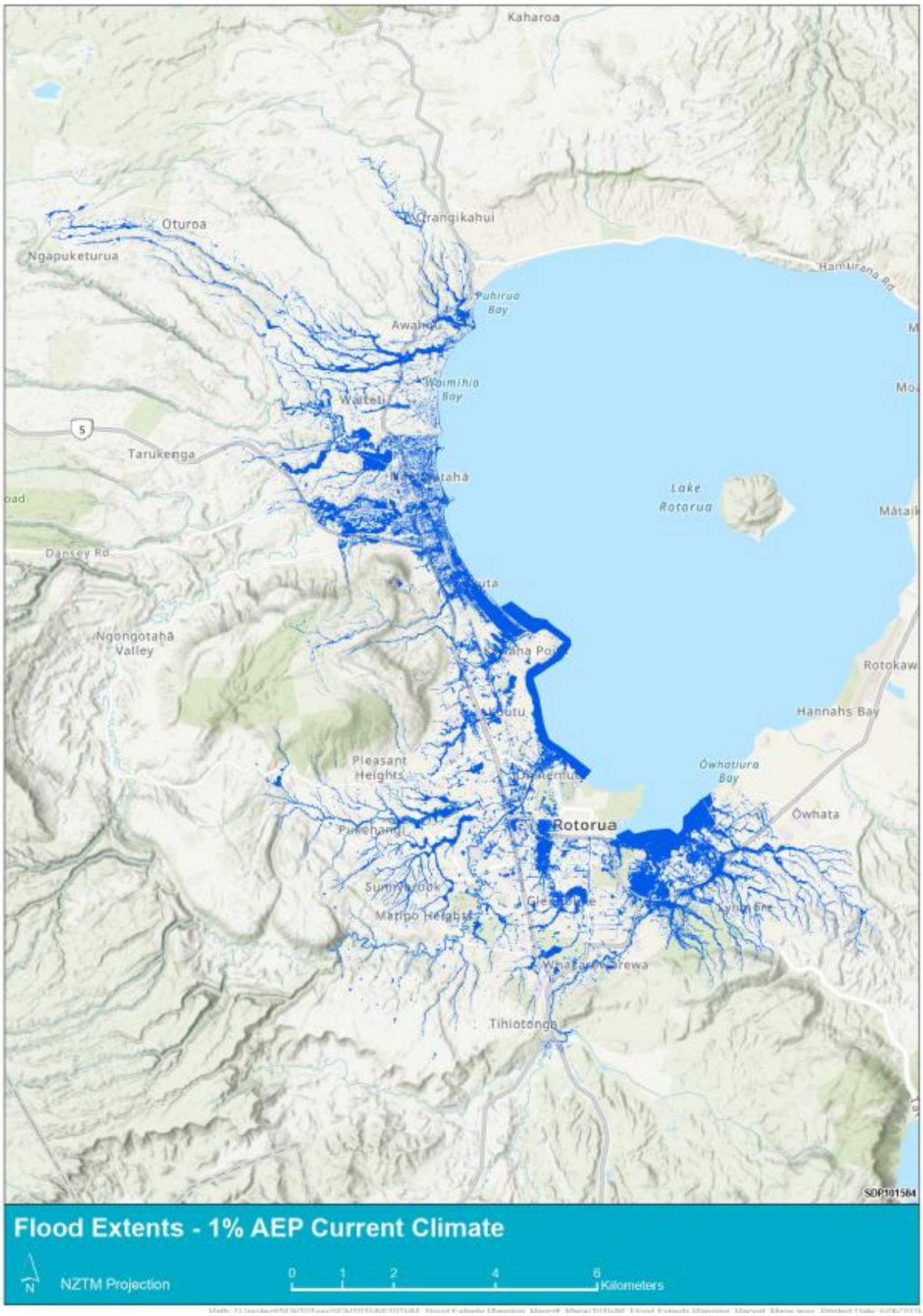


Figure 22 Modelled Flood Extents for the 1%AEP RCP 8.5 current climate event in the Rotorua Urban Area

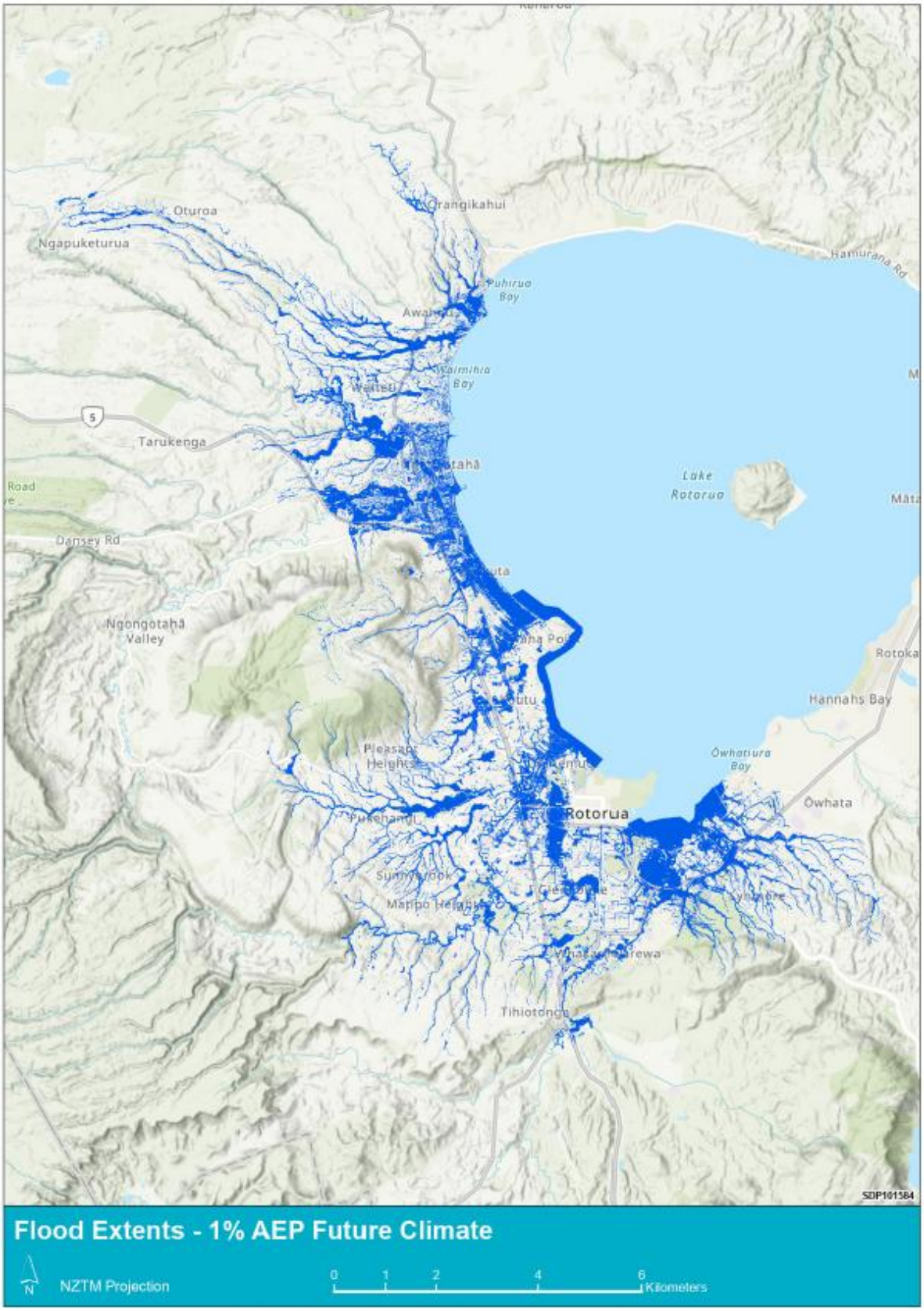


Figure 33 Modelled Flood Extents for the 1%AEP RCP 8.5 future climate in the Rotorua Urban Area

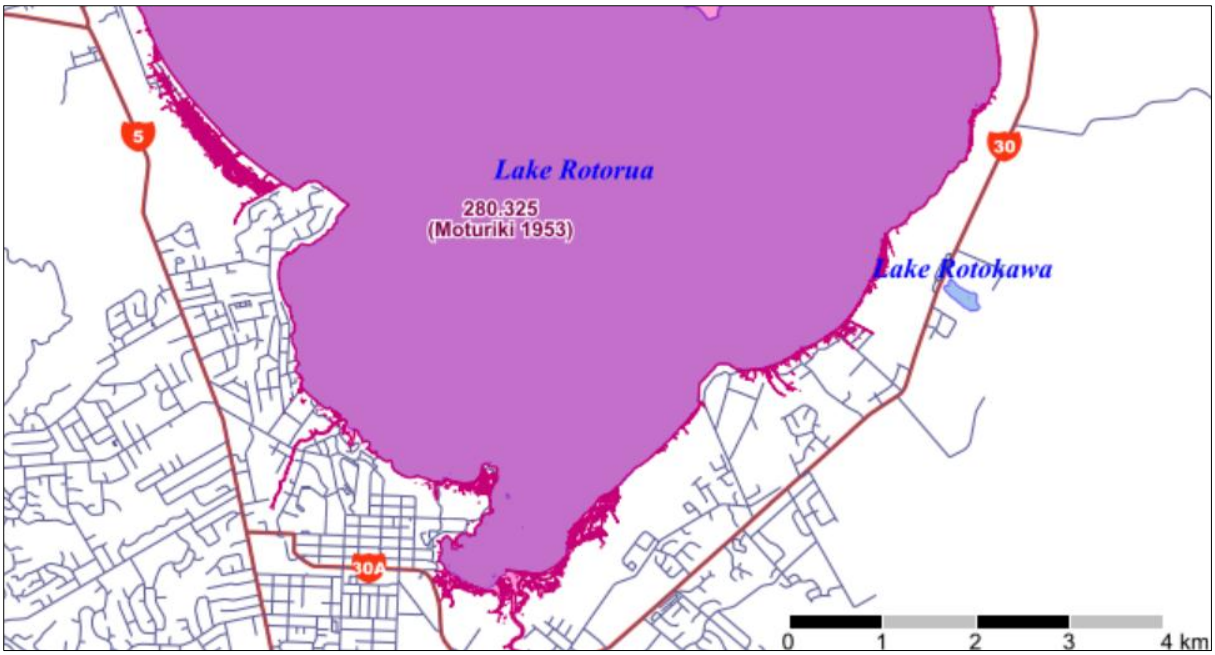


Figure 44 High Lake Level Mapping for 1%AEP event (with an allowance for climate change) – Lake Rotorua

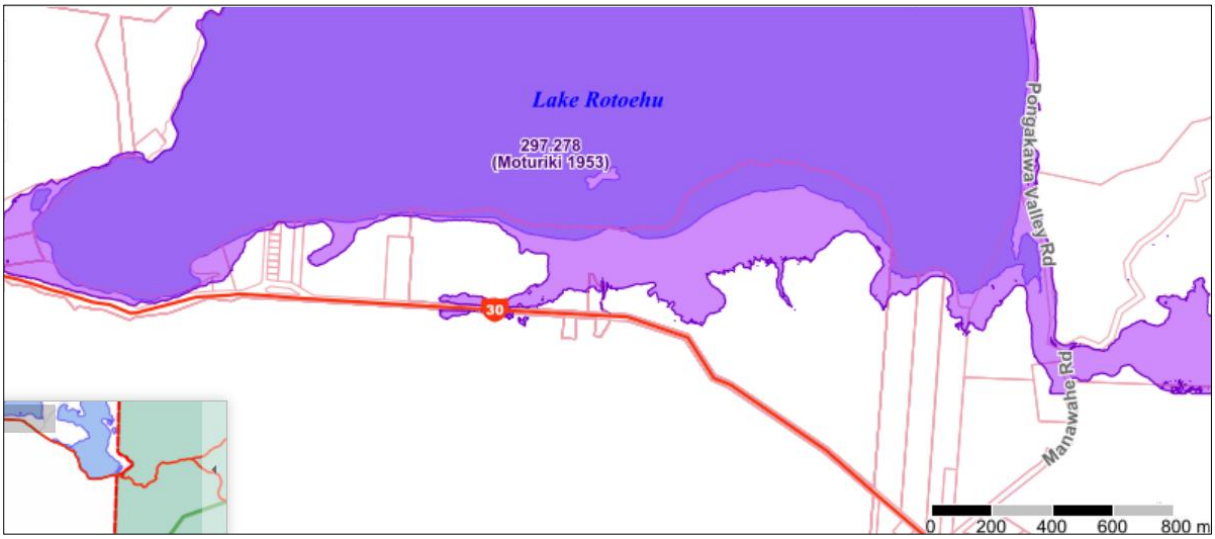


Figure 5 5High Lake Level Mapping for 1%AEP event - Lake Rotoehu

Figure 66 Example of Hazard Class Mapping for 1%AEP Current Climate

6.3 Flood Hazard Risk

6.3.1 Flooding Risk – Potential Consequences and Land Use Influences

Flooding has a wide range of potential consequences, including:

- Damage to property and infrastructure.
- Loss of life and injury.
- Business and service interruption.
- Contamination of waterways, for example with wastewater from sewage systems overloaded with stormwater.
- Impeding access to property.
- Associated stress and health impacts.

Land use can influence flood hazard and risk in the following ways, indicating areas where intervention through the District Plan may be appropriate:

- Increasing exposure – placing more assets and people in areas susceptible to flooding.

- Changing the ground surface – changes in vegetation and/or impervious surfaces can increase stormwater runoff and reduce groundwater recharge, altering the natural hydrological cycle resulting in more frequent flooding and higher flood peak flows.
- Diverting flows – changing the natural flow of water over the land through earthworks or placement of structures.
- Reducing flood storage – filling in areas that store water in floods with structures or earthworks so that less water is stored, and flood levels increase.

Further assessment of flood risk is provided in the sections below.

6.3.2 Flooding Risk Assessment under the Bay of Plenty Regional Policy Statement

As explained in section 3.3.2, the natural hazard risk assessment outlined in Appendix L of the BOPRPS is intended to categorise risk at the 'hazard zone' scale in order to identify the relevant risk management outcome under Policy NH 3B. Essentially, hazard zones with low risk should be managed to keep the risk low; hazard zones with medium risk should be managed to reduce risk to as low as reasonably practicable; and hazard zones with high risk should be managed to reduce the risk.

The method only applies to the Bay of Plenty Region, where most flood hazard information is currently available. Practice is to use the 0.2% AEP event to delineate the extent of an area susceptible to flooding and maximum extent of the hazard zones. Within this area, hazard zones can be segmented in different ways, giving potentially different risk results.

In 2021, NIWA completed a case study assessing flood risk using the BOPRPS method for four urban catchments (Te Ngae-Puarenga, Lynmore, Lynmore-Ōwhata and Koutu/Kawaha Point) using the risk assessment methodology outlined in the BOPRPS (Popovich and Paulik, 2021). The analysis was based on 2120 climate adjusted scenarios from RLC urban catchment models. This assessment focused on existing risk rather than risk to new development (the focus of a District Plan). Nonetheless, an analysis of risk to existing urban areas can provide insight into the potential for infill and redevelopment to be exposed to flood hazards.

Impacts on social/cultural and critical buildings have significant weight under this methodology, and the assessment found that all four catchments met the high-risk category in various event sizes, due to functional compromise of social/cultural buildings (assuming the buildings were functionally compromised if flood levels were 100mm at the building footprint).

In the Lynmore and Lynmore-Ōwhata catchments, high risk was also triggered by the percentage of miscellaneous buildings potentially functionally compromised in a 2% AEP event. When a more conservative assumption for when buildings would be compromised was used, high risk was not triggered.

A risk assessment for the Utuhina Catchment 'hazard zone' was also undertaken as part of the evidence presented on Plan Change 2 (Pukehāngi Heights) (Bay of Plenty Regional Council, September 2020). The primary analysis used 1% AEP 2130 climate adjusted event modelled for the Greater Utuhina Catchment Model and the secondary analysis used a 0.2% AEP event, but it is unclear whether the scenarios also included freeboard. Findings from this assessment included:

- In the primary analysis, significant spilling into the floodplain was noted throughout the urban extent. Some roads were inundated with floodwaters greater than 500mm deep, including State Highway 5. The flood protection assets in the Lower Utuhina were described as ineffective; and

- Approximately 250 buildings were identified as potentially functionally compromised assuming this occurs where depth at the building footprint equals or exceeds 500mm, giving a 'medium' level of risk. However, this was identified as likely to undercount the buildings, especially in industrial areas.
- For the secondary analysis of a 0.2% AEP event the risk category was assessed as high.
- Overall, a 'high' risk level was assigned to the Greater Utuhina Catchment.

It is noted that average individual annual fatality risk in a hazard zone forms part of the secondary analysis under the Regional Policy Statement but need only be addressed if primary assessments find medium or low risk (for Rotorua city catchments the assessments have found high risk).

As discussed in section 3.3.2, policy NH 4B of the BOPRPS also requires a low level of risk to be achieved on development sites. No method is described to assess risk at the development scale, but it is considered that it should be considered from various perspectives, including private property loss, wider social and economic disruption, and life safety.

6.3.3 Flooding Risk Assessment under the NPS for Natural Hazards Consultation Material

The consultation material for the proposed NPS for Natural Hazards applies risk assessment at the site-specific level, rather than across broader hazard zones.

Using the risk matrix from the consultation material, along with the depth and velocity data from hazard modelling, it appears that many existing sites are exposed to at least minor consequences in a 1%AEP flood event, both with and without the influence of climate change. This corresponds to a classification of 'medium risk' or higher.

Without careful management, future land use in these areas also be exposed to medium or higher levels of flooding risk. In other words, flooding on some sites poses 'significant risk' under the proposed definition and therefore would trigger the requirement for management as a matter of national importance.

Although this assessment currently carries limited weight, it supports the view that flooding presents a potentially significant hazard for some sites, if not effectively managed.

6.3.4 Flooding Risk - Other Comments and Conclusions

The risk assessments above demonstrate that flooding is a significant concern from the perspectives of property risk and building function. It is considered that there is clear justification for intervention to ensure that risks to new developments are acceptable.

Consultation with the BOPRC has also stressed the importance of life safety risks in the context of flooding. Experience in Rotorua and other flood events throughout New Zealand suggests that the risks to life from flood events is likely to be low, but still possible. These risks are difficult to quantify due to the many factors involved such as whether people are at home, whether they chose to evacuate and whether they suffer a fatal outcome from being exposed to flood hazard; and there is insufficient information to estimate all these factors.

Residual risk is relevant to both property and life safety risks, but it is difficult to capture in risk assessments. Two key aspects of residual risk are the potential for:

1. **Stopbank failure**
   Stopbanks are located along the mouth of the Utuhina River, Ngongotahā Stream and Waingaehe Stream. Failure of stopbanks could cause faster and deeper floodwaters than those modelled.

2. **Stormwater infrastructure blockage**
   RLC's catchment models assume stormwater infrastructure is operational, but stormwater infrastructure blockage can cause water to back up and cause flooding. This is considered less of a concern for policy development than stopbank failure because initial comparison of potentially affected areas (using detention area mapping on overland flowpaths) suggests that protection of property for the modelled 1%AEP flood extents will usually also address overland flowpaths. Legacy issues are expected to remain from the location of historic development and poor delineation of overland flowpaths. These are difficult to solve through the District Plan, which focuses on new development.

6.4 Existing District Plan Provisions for Flooding

The Natural Hazards chapter has an objective specific to flooding in the Waikato River catchment:

> *NH-O1: Manage subdivision, use and development in areas within the Waikato River catchment that are subject to high-risk flood hazard to minimise risk to people and property.*

'High risk flood hazard zone' is defined consistently with the WRPS as 'land within the Waikato river catchment that is subject to river or surface flooding during an event with an annual exceedance probability of no more than 1% and during such an event: a) The depth of flood waters exceeds one metre; b) The speed of flood water exceeds two metres per second; or c) The flood depth multiplied by the flood speed exceeds one'.

The Natural Hazards chapter (NH) also provides three flooding-specific policies, which were inserted through Plan Change 9 and apply outside the Lakes A Zone:

> ***Buildings in Areas Susceptible to Flooding***
>
> *NH-PA Manage the risks to people, property and the environment associated with development in areas susceptible to flooding by:*
>
> 1. *In areas where the anticipated flood depths are low and, therefore, the likely risks to people and property are less, requiring new buildings and larger additions to existing buildings to have floor levels above the flood level for the 1% AEP event with an allowance for climate change and freeboard.*
> 2. *In areas where anticipated flood depths are higher and, therefore the potential risks to people and property are greater, requiring a flood risk assessment for new buildings and larger additions to existing buildings and their associated site works to ensure the associated flood risks are acceptable. The assessment shall correspond to the nature and scale of the anticipated flooding on site and shall include assessment of:*
>   a) *The extent to which the flood risks (including residual risks) on site are managed to an acceptable level;*
>   b) *Whether the development will increase risks (including residual risks) to other people, property, infrastructure or the environment;*
>   c) *Safe evacuation routes and refuges; and*
>   d) *Impacts on overland flowpaths and river corridors.*

Overland flowpaths and river corridors

NH-PB *Maintain the function of overland flowpaths and river corridors to safely convey flood water and reduce risk to life, property and infrastructure by:*

1. *Maintaining the water carrying capacity of overland flowpaths and river corridors;*
2. *Maintaining the water storage capacity of major overland flowpaths and river corridors;*
3. *Restricting activities that may obstruct an overland flowpath; and*
4. *Assessing the impact of any changes to the entry or exit points of overland flowpaths on a site and the impact on other sites and infrastructure.*

Impervious surfaces

NH-PC *Restrict impervious surfaces to reduce the cumulative effect of stormwater run-off on flooding.*

District Plan rules that assist to manage flooding and respond to these objectives and policies are summarised below:

- Rule NH-R4, which was inserted by Plan Change 9, implements the risk-based approach to managing buildings set out in policy NH-PA. NH-R4(2) provides minimum floor level performance standards for buildings in areas with anticipated flood depths of 300mm or less in the design event (1%AEP for 2130, using RCP8.5 or national or regional guidance on climate change).
- In areas where flood depths are anticipated to be higher in the design event, NH-R4(4) requires resource consent as a restricted discretionary activity. The matters of discretion for NH-R4(4) are listed in NH-MD1 and provide the basis for a flood risk assessment. These matters include risk to the development, risk to other property, safe evacuation and maintenance of overland flowpaths.
- SUB-R43 provides a restricted discretionary activity status for subdivision of flood prone land. The matters of discretion are listed in SUB-MD2 and are similar to those provided for buildings in NH-MD1.
- Maximum impervious standards apply to some permitted activities in some zones. Notably, Plan Change 9 reduced these standards from 80% in Residential 1 Zone and 100% in Residential 2 Zone to 70% and 80% respectively.
- In terms of water displacement, the building coverage standards of the zone chapters are also relevant.
- Earthwork performance standards that provide maximum volumes of fill are also relevant to the issue of water displacement. These performance standards are not specific to flood prone areas but when the standards are exceeded the impact of natural hazards (e.g. reduced flood storage) can be considered under the matters of discretion (EW-MD3).

The following provisions apply in the Lakes A Zone:

- Objective 18 (which is proposed to be deleted except in relation to volcanic hazards – see section 5.2) seeks limited risks to human occupation and activity caused by the risks posed by natural hazards including flooding (river and lake level fluctuations).

- Policy 13.1 (which is proposed to be limited to volcanic activity and erosion and sedimentation) addresses several hazards including flooding:

To recognise that hazards arise from volcanic activity, seismic activity, geothermal activity, flooding, fire, erosion and sedimentation and apply measures that reduce risk to people and property.

- Policy 13.3 relates specifically to flood hazards:

  To avoid, remedy or mitigate the effects of a 2% AEP flood events arising from streams, ephemeral watercourses, and high lake levels.

- Rule 6 requires that building platforms are outside riparian areas, outside ephemeral watercourses and the 2% AEP lake flood level.
- Subdivision rule 40 requires that the access is clear of the 2% AEP lake level and ephemeral watercourses.

6.5 Management of Flood Risks outside the District Plan

For context, it is noted that there are also a range of legal and other methods outside the District Plan for addressing flood risks, including:

- Section 106 of the RMA, which enables a consent authority to refuse to grant a subdivision consent, or grant a subdivision consent subject to conditions, if it considers that there is a significant risk from natural hazards. A similar provision is being considered for land use consents under the recent RMA (Consenting and Other System Changes) Amendment Bill.
- Requirements in the BOPRPS for risk assessment and structure plans to accompany large subdivision and intensification proposals (Policy NH-9B and Method 18).
- Regional Plans (the Bay of Plenty Natural Resources Plan and Waikato Regional Plan), which manage disturbance of streambeds, damming and diversion of water, discharges and consenting of stormwater infrastructure.
- The natural hazard provisions of the Building Act (section 71 to 74) address whether a building consent can be granted when building on land subject to natural hazards (including flooding) and, if so, whether a notice about the hazard must be inserted on the land title.
- Clause E1 Surface Water of the Building Code provides minimum standards for drainage systems and for water entering buildings.
- BOPRC's Kaituna Flood Control Scheme includes protection works on some urban streams, lake level control on Lake Rotorua and Lake Rotoiti and stream maintenance activities. It also includes planned improvements, notably flood mitigation works for the Ngongotahā Stream.
- RLC's stormwater activities, the comprehensive stormwater consent and the catchment management plans to be developed under this consent.
- Emergency management and civil defence.
- Common law principles of servitude, nuisance and negligence also have relevance to flooding issues.

6.6 Regional Direction for District Plan Flooding Provisions

In addition to the hazard-generic direction from the regional policy statements outlined in section 3.3, there is also flooding-specific direction in the WRPS.

Methods in the WRPS require district plans to identify the location of areas affected by High Risk Flood Hazard (Method 7). It further requires district plans to control subdivision in these areas to avoid the demand for structures (Method 6) and ensure that use and development within High Risk

Flood Zones is appropriate (Method 10). High Risk Flood Zones are defined as land subject to river or surface flooding during an event with an AEP≤1%, and:

- the depth of flood waters exceeds one metre;
- the speed of flood waters exceeds two metres per second; or
- the flood depth multiplied by the flood speed exceeds one.

The WRPS also refers to floodplains, which are defined by the flood extent of a 1% AEP event. Methods require that district plans ensure subdivision and development in floodplains (method 11):

- can occur only where risk assessment is undertaken;
- risks do not exceed acceptable levels; and
- effects of a 1% event are avoided or mitigated.

Currently, there is no hazard mapping to identify High Risk Flood Zones or flood plains in the Rotorua District. Waikato Regional Council's practice note acknowledges that hazard mapping can be prioritised or staged, and it supports the use of a simple hazard modelling/identification processes that can provide 'flags' for further assessment at development stage e.g. based on past flooding (Waikato Regional Council, 2019). Waikato Regional Council's regional flood hazard mapping, once complete, should assist in flagging areas of concern in terms of the Regional Policy Statement.

It is considered that no changes are needed to the District Plan to give effect to the methods for High Risk Flood Zones or flood plains because the subdivision rules and minimum floor level/risk assessment regime for building under Rule NH-R4 and associated policies and matters of discretion already provide an appropriate response.

District plans in the Waikato region are also required to identify residual risk zones and control subdivision, use and development within these zones so that residual risk is minimised (Method 12). The associated guidance suggests the zones should map areas defended by structures. No such defended areas are known in the Waikato part of the Rotorua District to which this method applies. Nonetheless, it is agreed that mapping of defended areas in urban area may potentially add value to consideration of risks, which is discussed in section 6.9.

6.7 Issues Identified with Flooding Provisions

This plan change proposal continues to support key changes introduced with Plan Change 9, including:

1. The removal of flood mapping from the District Plan to enable the best information to be used to support decision-making.
2. The requirement for resource consent for building in areas where flood levels are expected to be more than 300mm in a 1%AEP event with an allowance for climate change, to enable consideration of whether the risks are acceptable (rule NH-R4(4)).
3. Clarification of the design standard for building floor levels (1%AEP event with an allowance for climate change and freeboard) for buildings in areas susceptible to flooding that do not trigger the requirement for the above risk assessment (rule NH-R4(2)).

However, consultation with Council planners, technical advisors and a review of existing provisions has identified several issues to inform further proposed changes to the District Plan:

1. **Lack of alignment in the Lakes A Zone and Waikato Region:**
   Flood hazard provisions in the Lakes A Zone apply a lower design standard of 2% AEP, compared to the 1% AEP standard with a climate change allowance used elsewhere in the district. While implementation of the Building Act and avoidance of hazard notices may result in higher standards being applied in practice, the inconsistency may create confusion and inefficiencies. Furthermore, objectives and matters of discretion specific to the Waikato Region differ from those applied elsewhere in the district, raising a question about the need for greater alignment to improve clarity and efficiency.
2. **Ensuring an Acceptable Level of Risk when Building in Flood Prone Areas:**
   Feedback from plan implementers indicated ongoing concern that, even with the introduction of new rule NH-R4(4), the District Plan does not provide sufficient regulatory strength ("teeth") or clearly signal that development should not proceed unless an acceptable level of flood risk has been demonstrated.
3. **Protection of Overland Flowpaths**
   The need to protect overland flowpaths—both to prevent blockage and to avoid downstream flooding—was identified as a key issue by Council engineers, planning staff and technical advisors. Although some provisions exist under the District Plan and the Building Act, feedback emphasised the need for clearer and more robust methods to address risks to and from these flowpaths.
4. **Protection of River Corridors**
   A recurring theme during consultation was the importance of protecting river corridors as critical for flood management.
5. **Management of residual risk**
   Consideration has been given to strengthening provisions to address residual flood risks—those that remain even after mitigation measures are implemented—to ensure communities and property are appropriately safeguarded in the long term.

For the avoidance of doubt, it is anticipated that submissions may address other issues related to flooding, provided they are not within matters identified as out of scope.

6.8 Proposed Changes to Flooding Objectives

It is proposed to delete the Waikato-specific objective NH-O1 and the associated definition of High Risk Flood Zones:

> ~~*NH-O1 Manage subdivision, use and development in areas within the Waikato River catchment that are subject to high risk flood hazard to minimise risk to people and property.*~~

Objective NH-O1 is inconsistent with the structure of the rest of the District Plan (which has strategic, hazard-generic objectives in the strategic direction section, supported by detailed policies in the Natural Hazards chapter). This inconsistency in approach potentially creates confusion for plan users and a risk that the strategic objectives are missed.

Furthermore, it is considered that this objective captures only a portion of the approach required under the WRPS (i.e. development in the most hazardous areas) and obscures the overarching objectives of the WRPS, as expressed in HAZ-O1, of increasing resilience, reducing risks to acceptable/tolerable levels, and enabling effective and efficient response and recovery.

6.9 Proposed Changes to Flooding Policies, Rules and Mapping

6.9.1 Remove Waikato-specific Policy

It is proposed to remove the Waikato-specific Policy NH-P1. It is considered that one set of policies applying to both the Waikato and Bay of Plenty parts of the Rotorua District will improve clarity and efficiency.

> ~~*NH-P1: Manage land use and development in areas subject to high risk flood hazard within the Waikato River catchment, including avoiding the placement of habitable structures which would be vulnerable to flood events and mitigating risks for non-habitable structures through design and location measures.*~~

6.9.2 Strengthen Policy to Ensure Acceptable Risk if Building in Flood Prone Areas

In response to concerns about a lack of 'teeth' to ensure an acceptable level of risk is established at the time of building, it is proposed to amend Policy NH-PA as follows to provide a stronger signal that consent may be declined (under rule NH-R(4)) where an acceptable level of risk is not demonstrated:

> *NH-PA Manage the risks to people, property and the environment associated with development in areas susceptible to flooding by:*
>
> *1. In areas where the anticipated flood depths are low and, therefore, the likely risks to people and property are less, requiring new buildings and larger additions to existing buildings to have floor levels above the flood level for the 1% AEP event with an allowance for climate change and freeboard.*
>
> *2. In areas where anticipated flood depths are higher and, therefore the potential risks to people and property are greater, requiring a flood risk assessment for new buildings and larger additions to existing buildings and their associated site works* *and declining consent if the flood risks are not shown to be acceptable* ~~*to ensure the associated flood risks are acceptable*~~*. The assessment shall correspond to the nature and scale of the anticipated flooding on site and shall include assessment of:*
>
> *a. The extent to which the flood risks (including residual risks) on site are managed to an acceptable level;*
> *b. Whether the development will increase risks (including residual risks) to other people, property, infrastructure or the environment;*
> *c. Safe evacuation routes and refuges; and*
> *d. Impacts on overland flowpaths and river corridors.*

The table below provides an assessment of this proposed change alongside other options to strengthen the provisions for building in flood prone areas that were considered less appropriate.

	Option 1: Retain the current provisions. Building in a flood prone area (where anticipated flood depths greater than that for a permitted activity) remains a restricted discretionary activity under NH(R4), guided by Policy NH-PA, with matters of discretion set out in NH-MD1.	Option 2: Amend the activity status for NH(R4) from restricted discretionary to discretionary. Move the matters of discretion in NH-MD1 to assessment criteria so that guidance remains about what to consider.	Option 3: Identify a 'higher' hazard area in which building will have a more stringent activity status, such as non-complying.	Option 4: Amend Policy NH-PA, as set out above, to provide a stronger signal that consent may be declined (under NH-R4(4)) where an acceptable level of risk is not demonstrated.
Relevant Objectives (as proposed to be amended)	*SDNH-O1: The risks from natural hazards to people, property and the environment associated with land use, subdivision and development are acceptable* *SDNH-O2: Land use, subdivision and development is resilient to the current and future effects of climate change*			
Efficiency and Effectiveness of Achieving Objectives	While resource consent for a restricted discretionary activity can be declined (s104C RMA), there may be a perception that restricted discretionary activities are usually approved. This may lead to a lack of due consideration and false expectations, creating issues achieving an acceptable level of risk and the objectives.	The discretionary status provides a stronger signal that resource consent may be declined and assists to ensure that there are clear expectations and sufficient assessment of the risks. However, it also provides less certainty about what will be considered in deciding applications, potentially reducing efficiency. Overall, considered less efficient and effective than option 4.	No basis upon which to delineate a separate area has been identified. Rather, it is considered that the level is risk is likely to relate to multiple factors including the hazard (e.g. depths, velocity, speed that flood waters rise, residual risk issues associated with protection works), site (e.g. egress routes) and nature of the development. Identifying a 'higher' hazard area with a more stringent activity status may have a perverse outcome where building in other areas is perceived as generally acceptable despite the potential existence of factors that may suggest an unacceptable level of risk.	The amended wording of NH-PA provides a stronger signal that resource consent may be declined and assists to ensure that there are clear expectations and sufficient assessment. Considered more efficient than option 2 because it also provides certainty about what will be assessed when deciding applications.
Costs and Benefits		Not consistent with RLC's drafting principle (used in PC9) to prefer restricted discretionary over discretionary activity status if the matters of discretion can be anticipated (to promote certainty)		Consistent with RLC's drafting principle (used in PC9) to prefer restricted discretionary over discretionary activity status if the matters of discretion can be anticipated (in order to promote certainty)
Risks of acting or not acting if insufficient information	The assessment of risk under all these approaches is subject to uncertainties e.g. in relation to flood hazard mapping, climate change, residual risks. Options 2 and 4 may assist to ensure that the decision makers have confidence to take these uncertainties into account when declining an application.			
Conclusion	Option 1 is considered less appropriate than option 4.	Option 2 is considered less appropriate than option 4.	Option 3 is not considered an appropriate option.	Option 4 is considered the most appropriate option.

6.9.3 Strengthen Management of Overland Flowpaths

An overland flow path is a path taken by stormwater as it concentrates and flows downhill over the land towards a stormwater system or water body. Overland flowpath is more fully defined in the District Plan as follows:

> *The land overflown by a concentrated flow of water in an intense rainfall event, as it flows towards the stormwater network, streams, rivers, or lakes. Overland flowpath includes a secondary flowpath which is activated when the primary (often piped) stormwater system gets blocked or when the capacity of the piped system is exceeded. For the purposes of this definition, an overland flowpath includes, but is not limited to, an artificially designed route using formed or hard surfaces.*

Management of overland flowpaths is important because, if the water in an overland flowpath is diverted by structures or by terrain changes, it can cause flooding elsewhere. Placing structures in overland flowpaths also puts the structures at risk. Furthermore, protection of overland flowpaths from development assists to enable upstream development, ensuring that the resulting stormwater can be conveyed safely.

Plan Change 9 inserted policy NH-PB (as set out above), which recognises the importance of the management of overland flowpaths. This policy can be considered at the time of subdivision. Overland flowpaths are further addressed in the matter of discretion NH-MD1(3) for buildings assessed as a restricted discretionary activity under NH-R4(4).

The following further options are supported to improve the management of overland flowpaths:

a. Amend policy to consider legal protection of overland flowpaths at the time of subdivision

An amendment is proposed to Policy NH-PB to require consideration of legal protection of overland flowpaths at the time of subdivision. This is intended to reflect and clarify current practice.

NH-PB Maintain the function of overland flowpaths and river corridors to safely convey flood water and reduce risk to life, property and infrastructure by:

1. *Maintaining the water carrying capacity of overland flowpaths and river corridors*
2. *Maintaining the water storage capacity of major overland flowpaths and river corridors;*
3. *Restricting activities that may obstruct an overland flowpath;*
4. *Assessing the impact of any changes to the entry or exit points of overland flowpaths on a site and the impact on other sites and infrastructure.*
5. *Considering legal protection of overland flowpaths at the time of subdivision through methods such as consent notices, easements or vesting of land in Council.*

b. New rule to protect the function of overland flowpaths from buildings and structures

An additional rule, as set out below, is proposed to protect neighbouring land from changes in overland flowpaths caused by buildings and structures. The rule is proposed to apply only in more intensely developed zones, where the risks are higher. Works authorised in a stormwater consent granted by the regional council are also proposed to be exempt for efficiency reasons, as this process provides an alternative option for considering and managing flooding impacts.

NH-R5	***Buildings and Structures in an Overland Flowpath***
Applicable Spatial Layers *Residential zones, City Centre Zones, Commercial Zones, Industrial Zones, Business and Innovation Zones, Lakes A Zone Settlement Management Area and Bush Settlement Management Area*	***1. Activity Status:*** *Restricted Discretionary* ***Where:*** *a. The building or structure results in a change to the entry or exit point of an overland flowpath on a site, pipes or reduces the capacity of the overland flowpath; and* *b. The activity is not authorised by a stormwater discharge permit granted by the regional council.* ***Matters of Discretion*** *a. The extent to which natural hazard risks are avoided or mitigated and the worsening of any hazard.*

c. Amend the performance standards for earthworks

An additional performance standard for earthworks is also proposed in EW-S1(1), as set out below, to protect neighbouring land from earthworks that result in changes to overland flowpaths in denser developed zones.

EW-S1 General earthworks performance standards

…

g. Residential zones, City Centre Zones, Commercial Zones, Industrial Zones, Business and Innovation Zones: it shall not result in a change to the entry or exit point on a site of an overland flowpath, or change the catchment size of an overland flowpath, except where the earthworks are for an activity authorised by a stormwater discharge permit granted by the regional council.

It is also proposed that this standard should apply to the many activities listed in EW-S1(2) that are otherwise exempt from the requirement to meet the permitted activity performance standards in EW-S1(1). Therefore, the following amendment is proposed to the exceptions from earthwork standards in EW-S1(2):

Notwithstanding the preceding requirements, the following activities are exempt from the performance standards above, provided that the activity meets EW-S1(1)(g):

d. Amend definition of overland flowpath

With the addition of rules and performance standards for overland flowpaths, it is considered that the definition also requires amendment to provide a threshold to when the rules and standards apply (even a small flow from a tiny catchment could be considered an overland flowpath under the current definition). A catchment limit of 4,000m^2 is proposed, based on consideration of practice in other districts and the benefits of consistency.

overland flowpath	*The land overflown by a concentrated flow of water in an intense rainfall event, as it flows towards the stormwater network, streams, rivers, or lakes. Overland flowpath includes a secondary flowpath which is activated when the primary (often piped) stormwater system gets blocked or when the capacity of the piped system is exceeded. For the purposes of this definition, an overland flowpath includes, but is not limited to, an artificially designed route using formed or hard surfaces.* *Overland flowpaths referred to in rules and performance standards shall*

	be limited to those with a catchment of 4000m^2 or more.

e. Map overland flowpaths

RLC is currently mapping the indicative location of overland flowpaths using a digital terrain model. The mapping is not considered critical to the implementation of the proposed rule and earthworks performance standard, since overland flowpaths can be determined from topography and existing mapping tools. However, it should assist RLC and the public to identify their location. It will need to be checked on site to determine how structures and changes in terrain not included in the model may alter the location of flow paths. This mapping does not form part of the plan change proposal but is discussed for context.

It is noted that typical flood hazard modelling using hydrodynamic models (such as those prepared for Rotorua urban catchments) focuses on flood extent and depths for low probability (large) events and is not targeted to the identification and management of overland flow that can occur in more frequent events. However, an initial comparison with the urban catchment models suggests that many overland flowpaths for catchments of 4000m2 or more are lie within the flood extents for a 1%AEP event.

	Option 1: Retain the current provisions. Overland flowpaths can be considered in building consent applications under the s71(1)(b) 'the building work is likely to accelerate, worsen, or result in a natural hazard on that land or any other property' and when Rule NH-R4(4) is triggered for building in an area subject to more than 300mm depth of flooding in a 1%AEP event with climate change. Common law principles also apply to resolve disputes involving diversion of overland flowpath.	Option 2: Amend the District Plan to further protect overland flowpaths by: • Including a clause in Policy NH-PB to consider whether to legally protect overland flowpaths at the time of subdivision; • Including an additional land use rule to protect the function of overland flowpaths from the impacts of buildings and structures; and • Amending the earthwork standards for specific (more intensely developed) zones to protect overland flowpaths. Overland flowpaths can continue to be considered under the Building Act s71(1)(b) and common law principles would continue to apply to resolve disputes involving diversion of overland flowpath.
Relevant Objectives (as proposed to be amended)	*SDNH-O1: The risks from natural hazards to people, property and the environment associated with land use, subdivision and development are acceptable* *SDNH-O2: Land use, subdivision and development is resilient to the current and future effects of climate change*	
Efficiency and Effectiveness of Achieving Objectives	The Building Act and Rule NH-R4(4) provide means to protect overland flowpaths, but many types of activities that could compromise overland flowpaths will remain exempt from scrutiny under consent applications, such as: • Fences less than 2.5m in height. • Earthworks not considered as part of the building consent. • Retaining walls less 1.5m in height. • Small single storey detached buildings <30m that meet the Building Act and District Plan exemptions (i.e. <30m, non-habitable and low value). While common law principles also provide an option to manage issues, these are complex and expensive for private individuals to enforce.	Policy NH-PB assists to promote the objectives by providing notice to subdivision applicants of the need to consider overland flowpaths and options for their legal protection. While there are efficiency challenges for the proposed structure rule and earthwork performance standard: • Many activities have existing use rights and do not need to comply with the proposed rules. It will be difficult to distinguish those that are new. • If no building consent is required, there is also limited potential for RLC to monitor compliance before issues arise. Some issues will likely need to be addressed reactively. • Mapping to identify the locations of overland flowpaths is only indicative and ensuring compliance with the rules is difficult for laypersons. Nonetheless, the rules provide a signal to consider overland flowpath locations and design developments to ensure their function is protected. They also provide an additional ground for enforcement to address issues. Their inclusion is considered more effective than the status quo for achieving the objectives
Costs and Benefits		There may be additional costs to RLC for its involvement in compliance investigation and enforcement actions for breaches of the proposed rule and earthwork performance standard. However, Council is often involved in neighbour disputes in any case, regardless of whether any specific rules apply.
Risks of acting or not acting if insufficient information		
Conclusion	Option 1 is the least appropriate option.	Overall, Option 2 is considered the most appropriate option.

6.9.4 Expand Matters of Discretion for Breaching Setbacks from Waterbodies

Providing space for rivers was frequently promoted as a guiding principle by those consulted on this plan change. Setting development back from streams and rivers reduces the risks when a stream or river floods. It also protects development from bank erosion and instability, and the potential meandering of streams and rivers. Setting development back may also enhance opportunities for future flood management works that are not currently envisaged. However, this principle is challenging to apply in existing urban areas where land near streams is already fragmented and developed, and further development expectations may exist.

As noted above, Plan Change 9 inserted policy NH-PB relating to river corridors. Policy NH-PA also requires that the impacts on overland flowpaths and river corridors are considered as part of flood risk assessments (under NH-R4(4)). This plan change proposes to further strengthen protection of river corridors by building on existing provisions for streams and rivers directed at protection of natural values.

The District Plan already requires resource consent for most new buildings within 25 metres from the bank of key rivers or streams identified as 'esplanade priority acquisition areas' (NATC-R3(7) and (8)). These setbacks apply to rural rivers as well as the urban Waitetī Stream, Ngongotahā Stream, Waiowhiro Stream; Utuhina Stream, Mangakakahi Stream, Puarenga Stream and the Waingaehe Stream. In the Industrial 1E and 2 Zones, and in Business and Industrial Zones, there is a broader requirement for resource consent for most buildings within 25m of any river or stream, but in Industrial Zones, only where the average width of the stream is 3m or more (NATC-R3(8)). In the Te Puia Site, the setbacks are reduced (NATC-R3(5)).

The activity status for non-compliance with these setbacks is discretionary in the Industrial 1 Zone and non-complying in the Industrial T Zone, which provides opportunity to consider all the policies and objectives of the District Plan. However, in other urban zones non-compliance with the setbacks is a restricted discretionary activity with matters of discretion limited to natural values. It is proposed that natural hazards are included as an additional matter of discretion as set out in the extract of the rule table below.

While the Building Act already provides opportunity to consider relevant hazards (flooding and land stability), this matter of discretion places a clear onus on those undertaking the building work to consider the hazards and may assist to encourage development patterns that are set back from water bodies, and therefore more resilient. Furthermore, there is often no flood hazard mapping to alert applicants and Council to potential issues and ensure they are considered through the Building Act, and many types of buildings are exempt from scrutiny under the building consent process.

NATC-R3	***Buildings and structures (including lake structures and infrastructure) adjacent to water bodies***
…[text omitted]	
Applicable spatial layer: *All Residential Zones* *All Rural Zones*	***7.*** ***Activity Status:*** *Restricted Discretionary* ***Where:*** *The activity is:* *a. New buildings (All Commercial Zones); or*

All Commercial Zones *All Reserve Zones*	*b. New Buildings or lake structures (All Residential Zones, All Rural Zones and All Reserve Zones); and* *c. Located within 25m from the margin of a lake, or from the bank of a river or stream shown in the Planning Maps as being an area identified for esplanade reserve acquisition unless otherwise specified.* ***Matters of Discretion*** *a. How the location of the building or structure continues to provide for the ability to obtain an esplanade reserve or strip in accordance with the esplanade requirements* *b. How the design and location avoids, remedies or mitigates any effects on the natural character of the water body and associated natural environment;* *c. How the building or structure avoids, remedies or mitigates adverse effects on habitat of fauna, or the ecological values of the water body;* *d. Construction debris shall not be placed, or allowed to enter a water body;* *e. The extent to which the disturbance and removal of indigenous vegetation is avoided, remedied or mitigated; and* *f. The extent to which natural hazard risks are avoided or mitigated and the worsening of any hazard.*
Applicable Spatial Layers: *All Residential Zones* *All Commercial Zones excluding Te Puia Site,* *All Rural Zones* *All Industrial Zones* *All Business and Innovation Zones*	***8. Activity Status:** Restricted Discretionary* ***Where:*** *a. Residential Zones and Commercial Zones (excluding Te Puia Site): The activity is the erection of a building within 25m from the edge of any river or stream identified in the Planning Maps as being an area identified for esplanade reserve acquisition, or any lake with a surface area in excess of 8 ha or within 5m of any esplanade reserve or strip.* *b. Rural Zones: The activity is erection of a building within 20m of the edge of any river or stream identified in the Planning Maps as being an area identified for esplanade reserve acquisition, or any lake with a surface area in excess of 8ha.* *c. Industrial Zones: The activity is the erection of a building, with the exception of water intake and outfall structures, within 25m of any river or stream with an average width of 3m or more, or lake of 8ha or more.* *d. Business and Innovation Zones: The activity is the erection of a building within 25m of any river or stream, or within 5m of any esplanade reserve or strip.* ***Matters of Discretion*** *a. How the location of the building or structure continues to provide for the ability to obtain an esplanade reserve or strip in accordance with the esplanade requirements* *b. How the design and location avoids, remedies or mitigates any effects on the natural character of the water body and associated natural environment;* *c. How the building or structure avoids, remedies or mitigates adverse effects on habitat of fauna, or the ecological values of the water body;* *d. Construction debris shall not be placed, or allowed to enter a water body;* *g. The extent to which the disturbance and removal of indigenous vegetation is avoided, remedied or mitigated; and* *e. The extent to which natural hazard risks are avoided or mitigated and the worsening of any hazard.*

6.9.5 Align Approach to Flood Hazards in the Lakes A Zone

It is proposed to align the approach to flooding in the Lakes A Zone with the rest of the District Plan by:

1. Extending the policies and rules in the Natural Hazards chapter (NH) chapter to the Lakes A Zone by:

    a) Amending the 'How the Plan Works' section of the District Plan to statie that the Natural Hazards chapter applies to the Lakes A Zone,

    b) Amending the status box in the NH chapter to clarify that it applies to the Lakes A Zone.

    c) Inserting an explanation into S1.1 Significant Resource Management Issues for the Lakes A Zone that the Lakes A Zone operates independently from the rest of the plan except in relation to Natural Hazards

    d) Inserting an explanation into 1.1 of Section 8.0 – Relationship to the Rotorua District Plan - stating that rules in the Natural Hazards chapter (NH) in the Hazards and Risks section of Part 2 of the District Plan apply to the Lakes A Zone, in addition to the rules of Section 7.0 of the Lakes A Zone.

2. Deleting Lakes A Zone policy 13.3, which is inconsistent with the policies and rules in the NH chapter:

    ~~*To avoid, remedy or mitigate the effects of a 2% AEP flood events arising from streams, ephemeral watercourses, and high lake levels.*~~

3. Amending Rule 6 (building platforms) by deleting the permitted activity performance standards requiring location outside the 2%AEP lake flood level and the matter of discretion the extent to which the building platform intrudes into the 2%AEP lake flood level, which are also inconsistent with the policies and rules of the NH chapter.

4. Adding an additional performance standard for earthworks in Rule 5.0 of the Lakes A Zone applying to Settlement Management Area and Bush Settlement Management Area as follows, consistent with the performance standard proposed for EW-S1(1):

    The earthworks shall not result in a change to the entry or exit point on a site of an overland flowpath, or change the catchment size of an overland flowpath, except where the earthworks are for an activity authorised by a stormwater discharge permit granted by the regional council.

5. Adding a definition of overland flowpath to the Lakes A Zone, consistent with that in the main part of the District Plan.

Insertion of additional standards in the General Subdivision Standards in the Lakes A Zone for sites susceptible to flooding or geothermal activity has also been considered, so that a stricter activity status would be triggered similar to the main part of the District Plan. However, as there are no permitted or controlled subdivision activities in the Lakes A Zone, this is not considered necessary. Instead, it is proposed to amend the matters of discretion for restricted discretionary subdivision, to ensure natural hazards can be addressed (see 12.1.1 below).

It is not proposed to amend the performance standard for building platforms in the Lakes A Zone that requires location of building platforms away from ephemeral watercourses (which is also referenced at subdivision in Rule 38).

The table below provides an analysis of this alignment in the Lakes A Zone:

	Option 1: Retain the current provisions. • Building platforms in the Lakes A Zone will remain subject to a permitted activity performance standard requiring location outside 2%AEP lake flood level and ephemeral watercourses (defined as carrying or ponding with water in a 2%AEP event). • Earthworks are subject to a permitted activity performance standard requiring location outside of an ephemeral watercourse (defined for the purpose of earthworks with reference to landform signals that show evidence of carrying water in more frequent events). • Overland flowpaths can be considered in building consent applications under the section 71(1)(b). • Common law principles also apply to resolve disputes involving diversion of overland flowpaths.	Option 2: Align the Lakes A Zone with the rest of the District Plan as follows: • Extend policies NH-PA (Building in Areas Susceptible to Flooding), NH-PB (Overland flowpaths and river corridors) and NH-PC (impervious surfaces) to the Lakes A Zone. • Extend NH-R4 to the Lakes A Zone. Buildings (with limited exceptions) in areas where anticipated flood depths ≤300mm would be subject to minimum floor levels for the 1%AEP event with climate. • Buildings in areas where flood depth > 300mm in a 1%AEP event with climate change would require resource consent as restricted discretionary activity. • Changes to overland flowpaths would be subject to proposed Rule NH-R5 and earthworks in the Settlement Management Area and Bush Settlement Management would be subject to a new performance standard to restrict changes in overland flowpaths. • Overland flowpaths can continue to be considered in building consent applications under the section 71(1)(b). • Common law principles would continue to apply to resolve disputes involving diversion of overland flowpaths.
Relevant Objectives (as proposed to be amended)	*SDNH-O1: The risks from natural hazards to people, property and the environment associated with land use, subdivision and development are acceptable* *SDNH-O2: Land use, subdivision and development is resilient to the current and future effects of climate change*	
Efficiency and Effectiveness of Achieving Objectives	Building and earthworks in ephemeral watercourses is regulated but there is no mapping tool to identify ephemeral watercourses and they have a narrower definition than overland flowpaths. Some structures that could divert overland flows to affect neighbouring properties are not restricted, such as fences, so resolution of issues is left to common law principles, which can be difficult and expensive for private individuals (see discussion in 6.9).	The two-pronged approach to building in a flood prone area, involving minimum floor levels where flood depths are less severe and a restricted discretionary activity where flood depths are more severe, provides greater guidance for decision-making than the Lakes A Zone approach of requiring consent as a discretionary activity when building inside a flood prone area. Assists to achieve objectives with respect to risks to neighbouring properties from overland flowpaths in more intensely developed management areas, as explained in 6.9.3 Provides a more consistent approach to flood management across the Rotorua District, which may may reduce confusion and improve efficiency. The two-pronged approach which enables building in flood prone areas (subject to meeting minimum floor levels) on sites where the anticipated flood depths are less severe assists to improve certainty for applicants about the compliance pathway for building on low-risk sites.
Costs and Benefits	Approach to flood management is inconsistent across different parts of the district, which can be seen as unfair.	May help to reduce compliance costs for building on low-risk sites where minimum floor levels are met.
Risks of acting or not acting if insufficient information		
Conclusion	Option 1 is less appropriate than Option 2.	Option 2 is most appropriate.

6.9.6 Remove Matters of Control/Discretion and Assessment Criteria in Rural Zones

With the introduction of NH-R4 by Plan Change 9 it is no longer considered necessary to retain matters of control, matters of discretion and assessment criteria in the Rural Zone chapter relating to building in the Waikato River catchment and mitigation of flood risk for the 1%AEP event. These are proposed to be deleted as follows:

RURZ-MC4 Natural hazards / RURZ-MD4 Natural hazards / RURZ-AC1

~~*The extent to which new or replacement buildings or additions to existing buildings, for the purpose of habitation located within the Waikato River catchment mitigate the flood risk caused by a 1%AEP (Annual Exceedance Probability) storm event (1 in 100 year return period flood event).*~~

6.9.7 Other Matters Considered - Residual Risk

As noted above, two key aspects of residual risk in the Rotorua District are the potential for stopbank failure and stormwater infrastructure blockage. These are not expressed in typical flood hazard mapping, making it difficult to understand the risks. Furthermore, while residual risks are a matter of discretion where consent is triggered for building in a flood prone area under NH-R4, it is difficult to understand the risks and apply the discretion without guidance.

It is considered that understanding of residual risks could be improved by mapping of 'defended areas' from stopbanks. This does not form part of this plan change but is suggested as a potential future project with BOPRC. Additional policies and rules could potentially be developed for these areas in the future but are not included in the current proposal.

RLC also plans to map depression areas vulnerable to stormwater blockage but expects there will be good alignment with flood hazard mapping.

7. Te Ahiniwha – Wildfire

7.1 Scope of Plan Change for Wildfire and Summary of Proposed Changes

This plan change is intended to provide an opportunity for a full review of the District Plan provisions relating to wildfire. However, restrictions on vegetation disturbance, while relevant to wildfire are not in scope.

Key proposals relating to wildfire in this plan change are:

1. Inclusion of a definition of wildfire in the District Plan
2. Refining firefighting water supply standards in Rural Zones so they apply at land use, and not only subdivision, but limiting requirements to the more densely populated Rural 2 Zone and Rural 3 Zone, and the Settlement Management Area and Bush Settlement Management Area in the Lakes A Zone (RURZ-S5A, SUB-S9(3), Rule 34.0).
3. A new policy, which would also apply to the Lakes A Zone, to acknowledge the use of firefighting water supply to assist mitigate the risks of wildfire; and which also seeks to encourage (rather than require) further consideration and mitigation of wildfire through subdivision design in Rural Zones and at the urban-rural fringe (NH-P6).

Further detail on the proposed changes, as well as background information and an evaluation of the changes, is provided in the following sections of the report.

7.2 Wildfire Hazards affecting the Rotorua District

Wildfires are, essentially, uncontrolled fires in the natural environment. Most are caused by people. In the 2021/2022 season, for example, the top causes of wildfire were pile burns, then 'cigarettes, matches and candles' (Gross et al., March 2024)).

At a national level, Scion reported in 2015 an average of around 3,000 wildfires per year (M Harnett, 2015), while Fire and Emergency New Zealand reports a rising average from around 3,000 to nearly 5,000 wildfires per year (Fire and Emergency New Zealand, July 2024). In terms of the area affected in New Zealand, Fire and Emergency report that, over the 34 years from 1988/1989 to 2021/2022, the ten-year average for the number of hectares burnt has ranged from around 4,000-7,000 hectares per year (Gross et al., March 2024).

Climate change is expected to increase the risk of wildfires in New Zealand. According to Ministry for the Environment climate change guidance, "Fire weather indices are projected to increase in many parts of New Zealand (medium confidence), in particular with respect to extreme fire," (Bodeker, G, et al., 2022). Fire and Emergency explain (Fire and Emergency New Zealand, July 2024):

> *Weather is a key component of the fire environment, and an essential element of fire behaviour and fire danger. Strong winds, high temperatures, low humidity, and seasonal drought, can combine to produce dangerous fire weather situations. Evidence suggests that climate change is exacerbating these conditions, and subsequently increasing wildfire risk*

A difficulty in developing this plan change is understanding the significance of this hazard to the Rotorua District and the need for intervention.

We understand that Fire and Emergency New Zealand (FENZ) are currently developing a GIS tool to identify areas that are particularly susceptible to wildfire, but that this is still some time away from release.

Historic fire danger ratings calculated by NIWA (based on rainfall, temperature, relative humidity and wind speed) for 30 sites around New Zealand, including a site in Rotorua, give an indication of the risk at this site relative to other parts of New Zealand. If forest fuel is assumed, Rotorua had an average of only 2 very high or extreme (VHE) fire days per year. This placed the Rotorua site 23rd out of the 30 sites monitored (that is, approximately in the lowest quartile). However, the research also identified a 'likely increasing' trend (Macara and Sutherland, 2024). The research is also only relevant to the specific site, not the whole Rotorua District.

Factors that make an area more susceptible to wildfire, as identified in in a recent workshop with RLC staff and technical experts, and in literature, include:

- Vegetation type – vegetation affects the potential for wildfires to start, as well as the intensity and the difficulty to manage a wildfire to prevent it from spreading.
    - Grasslands have increased fire danger most rapidly during short dry spells (which is reflected in the NIWA fire danger rating system). This is because grass dries out quickly and fires in grassland spread quickly. However, wildfires on grassland are easier to control.

    - Scrub is also associated with more frequent high fire danger. It takes longer to dry out than grass but also creates more intense fires.
    - Forests are associated with less frequent high fire danger. However, when they do occur, cause more intense fires that are more difficult to control.

- Degree of human activity – human activity is the main source of ignition.
- Related to the above factors, the rural-urban fringe has been the focus of management in other jurisdictions, such as the United States, because these areas bring together population and fuel sources.
- Topography and prevailing winds – fire travels faster upslope; and sunny slopes and slopes exposed to the wind dry out faster; so north/northwest facing slopes are more susceptible.
- Soil types – some soils are more vulnerable to drying out and supporting fire spread.
- Proximity to Geothermal scrublands – geothermal activity can ignite fires that spread to surrounding dry scrubland, such as experienced at Sulphur Point in 2022 (NZ herald).
- Proximity to powerline infrastructure and rail corridors – other sources of ignition.

7.3 Wildfire Risk

7.3.1 Wildfire Risk – Potential Consequences and Land Use Influences

Wildfire has the potential to cause damage to people, property, vegetation and ecosystems. Wildfires can also impact the climate by releasing large quantities of carbon dioxide and other greenhouse gases into the atmosphere, which may not be fully re-sequestered or take a significant time to recover.

Land use factors that influence risk, which were identified in the workshop with RLC staff and technical experts or in literature, include:

- Increasing population – as noted above, human activities cause most ignition. Examples of common ignition-causing activities in the Rotorua District identified in the recent workshop were pile burns (associated with lifestyle property owners, farming and marae activities), and fur burning associated with pig hunting.
- Siting of vulnerable assets, including residential units – relative to the areas more susceptible to wildfire outlined above.
- Vegetation management around vulnerable assets – to reduce the risk of fire ignition and spread to the asset.
- Quality of vehicle access – whether suitable for emergency vehicles and egress in the event of an emergency.
- Access to water for firefighting – limited water sources can delay or inhibit response and increase the risk of fire spreading.
- Remoteness – wildfire can spread and intensify if there is a delay in detection or response with remote sites at greater risk.
- Characteristics of occupants and whether they can easily evacuate e.g. they have access to vehicles or whether they have disabilities.

7.3.2 Wildfire Risk Assessment – Comments and Conclusions

Understanding the level of wildfire risk is critical to determining the appropriate role of the District Plan in managing this hazard. However, wildfire risk is challenging to assess in the Rotorua District. Existing frameworks for natural hazard risk assessment – in the Bay of Plenty Regional Policy Statement and the consultation material for the proposed National Policy Statement for Natural Hazards – are not intended to apply to wildfire. Furthermore, we are not aware of any risk assessments of assistance for understanding the significance of wildfire risks and priority for district-level intervention in the Rotorua District.

At a national scale, historical data indicates an average of approximately 6,000 hectares affected by Wildfire annually. This equates to a low average annual probability of any hectare being affected – around 0.02%. However, this figure does not show the potential for local variability due to differences in vegetation type, land use, etc.

In terms of life safety, the absence of reported fatalities in recent history suggests that the risk of loss of life due to wildfire in New Zealand has been low to date. Nonetheless, there is a projected increase in wildfire-conducive conditions due to climate change.

In summary, while current wildfire risks in the Rotorua District do not appear high relative to other natural hazards, the risk profile is expected to worsen in the future. It is considered that this uncertainty warrants consideration of whether existing planning provisions are sufficient, but there is still a need to provide a proportional response.

7.4 Existing District Plan Provisions for Wildfire

Subdivision Policy SUB-P16 is 'Ensure applications for subdivisions demonstrate that the water supply capacity, including capacity for firefighting purposes, is sufficient for the development'. Otherwise, for the main part of the District Plan (outside the Lakes A Zone), there are no specific objectives and policies relating to wildfire. Relevant rules include:

- **Water Supply standards for firefighting purposes**
  Subdivision performance standard SUB-S9 requires that water supply shall be adequate for fire-fighting purposes. This standard applies to all zones and has been implemented with, for example, consent notices requiring firefighting water supply to be provided to future buildings.

  Performance standard RESZ-S5A, which applies to residential units in Residential Zones requires that, if an area is not reticulated, an applicant must provide alternative water supply adequate for firefighting proposes in accordance with the relevant NZ code of practice. The recently operative Papakāinga rules also have a requirement for providing sufficient water supply for firefighting purposes with reference to the NZ code of practice.

  There are no similar standards for other types of land use activities or for land use in other zones.

- **Setbacks from Forestry**
  Performance standard RURZ-S6 Reverse Sensitivity requires that no building or dwelling in Rural Zones be erected within 30m from the edge of an established plantation forest. The heading identifies that the performance standard is directed at reverse sensitivity (most likely reducing conflict about tree shading), and not wildfire management. It can have potential benefits for fire management in terms of a potential fire break (if vegetation within is maintained) and enhanced access. However, there are no criteria for assessing wildfire risk

should a development propose to breach the standard. Forestry is a deemed a permitted activity in all Rural Zones (Rule RURZ-R6) and is not, itself, subject to district plan setbacks from activities that would have significant consequences should wildfire spread to them, such as dwellings (but see the National Environmental Standard for Commercial Forestry below for setbacks relating to commercial forestry).

- **Accessway Standards**
  Accessway standards apply to subdivision in all zones with access serving residential units (SUB-S9). The firefighting water supply standards that apply at subdivision in SUB-S9 also address access quality to the water source.

  In Residential Zones a minimum legal width for accessways to residential units of 4m is required for accessways over 50m to enable fire fighting vehicle access (or hardstand for firefighting purposes provided within 50m of residential units) (RESZ-S5). Similar standards apply to papakāinga in all zones (PK-S1).

  Outside of Residential Zones and Papakāinga, no access standards apply to activities that are not considered as part of a subdivision.

Also of note is that there are a number of objectives, policies and rules that seek to retain vegetation for protection of natural character, significant natural values and outstanding landscapes but potentially have implications for wildfire risk management. An example of these rules is ECO-R4, which restricts most vegetation disturbance in a Significant Natural Area and relates to objective ECO-O1:

> *ECO-O1: A network of healthy functioning areas of significant indigenous vegetation and significant habitats of indigenous fauna with a high degree of ecological integrity, intactness, interconnectivity and cohesiveness.*

In the Lakes A Zone, Policy 12.2, Policy 13.1 (which is proposed to be limited to volcanic activity, erosion and sedimentation) and Policy 13.4 are relevant:

> *P12.2 To ensure water supplies with sufficient capacity for fire fighting within Gazetted Fire Districts.*
>
> *P13.1 To recognise that hazards arise from volcanic activity, seismic activity, geothermal activity, flooding, fire, erosion and sedimentation and apply measures that reduce risk to people and property.*
>
> *P13.4 To not restrict re-vegetation and afforestation to avoid fire risk, but to rely on firefighting prevention and evacuation.*

(It is our understanding that the whole of the Lakes A Zone was in the Pumicelands Gazetted Fire District when the Lakes A Zone).

While Policy 12.2 refers broadly to water supplies, the corresponding performance standards in Rule 34 only require community water supplies to have capacity for fire protection purposes. These are defined as 'a publicly owned drinking water supply which serves 25 or more people for at least 60 days per year'. The explanation and principal reason for including these Lakes A zone provisions (which are proposed to be deleted) is "*provision of water for firefighting purposes reduces the risk to life and property*".

The Lakes A Zone also includes extensive rules to restrict vegetation disturbance for the protection of the outstanding landscape values of this area (Rule 2.0). These have implications for wildfire risk management but are not reviewed in this plan change.

7.5 Management of Wildfire Risks outside the District Plan

7.5.1 Regional Policy Statements and Regional Plans

Regional Plans have rules relevant to air discharges from burning and water takes for firefighting.

With respect to the capacity to respond to fires, the WRPS includes a method for not siting fire services and other critical facilities in areas at high risk of natural hazards such as tsunami run-up areas (HAZ-M14-Planning for readiness, response and recovery).

7.5.2 NES for Commercial Forestry

Central government developed a National Environmental Standard (NES) for managing forestry in 2018 to increase the efficiency and certainty for forestry activities. The standard applied to plantation forestry and did not consider the management of other forestry or vegetation types. In 2023, the standard was amended and extended to also cover exotic continuous cover forests (carbon forests) deliberately established for commercial purposes.

Relevant to management of fire risk, the NES includes permitted standards for setting afforestation away from other properties and areas of high value and consequences should a wildfire spread:

- 10m from the boundary of an adjoining property in separate ownership that is not also commercial forestry
- 40m from a dwelling
- 30m from land zoned as papakāinga or an urban area
- 10m of a significant natural area.

Matters of discretion when these permitted standards are breached include the effects on adjacent landowners, dwellings, land zoned in a district plan as a papakāinga, and urban areas.

Rules in District Plans can be more lenient or stringent (clause 6).

7.5.3 Fire and Emergency New Zealand Act 2017

The Fire and Emergency Act 2017 provides FENZ some powers relevant to land use activities. For example, FENZ may remove from any land or buildings on fire or endangered flammable, combustible, explosive or dangerous material (section 42) and cut down vegetation on fire or endangered (section 43). FENZ may also, by notice, if they reasonably consider it necessary for the purpose of fire control, require a landholder to make and clear any firebreak on the landholder's land and to remove from any firebreak any vegetation or other thing (section 62).

7.5.4 Fire Fighting Water Supplies Code of Practice

The *Firefighting Water Supplies Code of Practice* (NZS PAS 4509:2008) provides nationally consistent guidelines for ensuring adequate water supply and access for firefighting purposes. The Code is incorporated by reference in the District Plan's standards for residential units in residential zones and provides guidance for implementing subdivision standards.

Key provisions of the Code include:

- **Water Supply Requirements**: Specifies the volume and flow rates needed for different building types and fire risk categories. In the absence of a reticulated network (or where insufficient water supply is available in the reticulated network), on-site water storage (e.g. tanks, ponds, dams) is supported. Minimum volumes are based on building size and risk category.
- **Access Standards**: Establishes requirements for vehicle access to the water source and maximum distances from the water source to the premises. Alternative, non-reticulated water sources should be located within 90m of the building and access to the water supply must be available for a 20-tonne vehicle.

7.6 Regional Direction for District Plan Wildfire Provisions

No specific regional plan or regional policy statement provisions (in addition to those discussed for all hazards in section 3) have been identified to guide the development of the District Plan with respect to wildfire.

7.7 Issues Identified with Wildfire Provisions

While there are currently some methods in place that assist to manage wildfire risks, there has been a lack of clear acknowledgement in the District Plan of wildfire as a hazard, which is considered to discourage consideration and management of the risks. This plan change considers whether any additional policies and methods are appropriate in the context of increasing wildfire risk.

The plan change also considers issues around consistency of firefighting water supply requirements at subdivision and land use and whether these can be more efficiently targeted to high-risk areas.

7.8 Proposed Changes to Wildfire Policies and Rules

7.8.1 Include a Definition for Wildfire

It is proposed to assist encourage consideration of wildfire as a type of natural hazard in the Rotorua District through the inclusion of a definition as follows:

> *any natural-caused or unplanned human-caused fire that is burning in and consumes natural fuels: forest, brush, tundra, grass, for example*

This definition was provided through consultation with GNS Science staff involved in wildfire research.

7.8.2 Refine Firefighting Water Supply Requirements.

Consultation with local planners and development engineers has raised concern about the degree to which firefighting water supply required for buildings assists to reduce the risk of wildfire in the context of rural properties, where arrival by emergency services is delayed by long travel times. While it is difficult to quantify the benefit, it is considered, consistent with the position expressed by the Fire and Emergency New Zealand, that firefighting water supply assists in risk reduction, by improving opportunities to contain property-level ignitions before they escalate into larger wildfires that are difficult to control. However, it is also considered that the cost-benefits of requiring firefighting water supply and opportunities to target the requirements to higher risk areas should be considered as part of this plan change.

The main part of the District Plan requires firefighting water supply for buildings to be addressed at the time of subdivision in all zones; however, this requirement is not consistently carried through to land use. As a result, there are situations where, for example, a residential unit on a rural lot must provide

firefighting water supply tanks due to a subdivision consent notice, while a neighbouring unit—on a lot subdivided prior to such requirements— would not be subject to the same obligation. This inconsistency is considered inequitable.

To address these issues and enhance wildfire resilience, it is proposed to align firefighting water supply requirements more consistently between subdivision and land use stages, while limiting such requirements to more densely developed zones, where the risks of wildfires starting are higher due to greater population.

This proposed approach consists of amending Policy SUB-P16:

> *SUB – P16 Ensure applications for subdivisions demonstrate that the water supply capacity ~~including capacity for firefighting purposes fir the development,~~ is sufficient for the development and includes capacity for firefighting purposes in the more densely populated zones.*

It is also proposed to amend SUB-S9(3)(b) Site serviceability as follows:

> b. ***Water services***
>
> *i. All existing available water services shall be extended wherever practically possible. Council will consider the capacity of the existing utility service to connect to each new site within the subdivision, to service future land use in the catchment, and the adequacy of the existing utility services available, including potential to upgrade such services to ensure adequate capacity;*
>
> *ii. New water services shall be provided for within road reserves;*
>
> *iii. Unless otherwise provided for by this plan, all services are expected to be entirely underground;*
>
> *iv. The services to each site shall be independent from the point of supply and to the point of discharge;*
>
> *v. All existing water services serving the sites in the subdivision and that are located on adjacent sites must be identified, including all existing and proposed easements associated with the provision of water services; and*
>
> *vi. The water supply shall be adequate for fire-fighting purposes except in the Rural 1 zone and the Reserve 1 zone.*

It is further proposed to insert a performance standard 'Servicing' (named for consistency in the Residential Zones) in the Rural Zones chapter (RURZ):

> *A water supply adequate for firefighting purposes shall be provided to the development in accordance with the New Zealand Fire Service Firefighting Water Supplies Code of Practice SNZ PAS 4509: 2008.*

This is proposed to apply to the following permitted or controlled activities in Rural 2 and 3 Zones, which are considered activities vulnerable to ignition:

- Residential Units (RURZ-R9)
- Veterinary Clinics (RURZ-R12)
- Retail Shop (RURZ-R13)

- Show homes (RURZ-R14)
- Office activities (RURZ-R15)
- Community housing (RURZ-R17).

7.8.3 Include a Wildfire Policy

It is proposed to insert a new policy in the Natural Hazards chapter (NH-P5) to clarify how wildfire is addressed through firefighting water supply and accessway standards, and through consideration at subdivision.

Policy NH-P5 is also proposed to include a clause relating to consideration of wildfire risks and mitigation options at the time of subdivision in rural zones and in the urban-rural fringe. As discussed in section 12 of this report, general matters of control, discretion and assessment criteria to enable consideration of natural hazards at the time of subdivision are proposed (SUB-MC1, SUB-MD2, SUB-AC1). However, consultation has highlighted a lack of confidence about when and if wildfire should be considered. Given that risk assessments have not suggested a high risk generally for the Rotorua District, it is considered that the matters of control/discretion and assessment criteria should be supported with a policy that encourages, rather than requires, consideration and mitigation, as follows:

> ***Wildfire***
>
> *NH-P5 Mitigate the risks of wildfire associated with development by:*
>
> 1. *Requiring firefighting water supply for activities in more densely populated zones and papakāinga to reduce the risk of wildfire occurring.*
> 2. *Encouraging subdivision design in rural areas and at the rural-urban fringe to consider the potential risks of wildfire and, where appropriate, include measures that may help reduce the risks. Such measures may include:*
>   a. *identifying suitable locations for building platforms and accessways that reduce exposure to wildfire hazards and facilitate egress;*
>   b. *facilitating access for emergency services; and*
>   c. *choice of plant species to reduce the risk of fire.*

7.8.4 Include Wildfire in Planting Principles for Pukehāngi Heights Development Area

It is proposed to include wildfire in the principles for the development in the Pukehāngi Height Development Area.

> ***Principles***
>
> *The general principles for the Pukehāngi Heights Development Area are:*
>
> 1. *Development that responds to the landscape values of the Caldera Rim and the topography of the area;*
> 2. *Development that recognises, protects and provides for the expression of the cultural and archaeological values of the area;*
> 3. *Roads, walkways and cycleway connections throughout the area and connecting with adjoining sites;*
> 4. *Comprehensively designed low impact stormwater management integrated with development;*
> 5. *Enhancement of ecological values by including indigenous vegetation plantings while considering the risk of wildfire;*

6. *Excellent urban design outcomes including for solar access and passive surveillance of public spaces; and*
7. *Development that is designed within nutrient management limits and contributes to the reduction in nitrogen entering Lake Rotorua.*

7.8.5 Align the Approach to Wildfire in the Lakes A Zone

Lakes A Zone Policy 13.1 recognises that hazards arise from volcanic activity, seismic activity, geothermal activity, flooding, fire, erosion and sedimentation and apply measures that reduce risk to people and property. It is proposed to remove reference to fire (and other hazards except for volcanic activity) in this policy and instead apply the more specific Policy NH-P5 in the natural hazards chapter proposed above.

It is also proposed to delete Policy 13.4:

> ~~*P13.4 To not restrict re-vegetation and afforestation to avoid fire risk, but to rely on firefighting, fire prevention and evacuation.*~~

Proposed Policy NH-P6 is considered a more appropriate response to achieve the natural hazard objectives of the District Plan, while also considering other potentially competing objectives and policies, such as to protect natural character and outstanding landscape values. Policy NH-P6 would need to be read alongside the rest of the District Plan, encouraging identification of options that promote the District Plan as a whole, for example, choice of planting species that reduce wildfire risk around structures.

Policy P12.2 is also proposed to be deleted on the basis that it is now covered by proposed Policy NH-P6 in the Natural Hazards Chapter:

> ~~*P12.2 To ensure water supplies with sufficient capacity for fire fighting within Gazetted Fire Districts.*~~

It is also proposed to amend Lakes A Zone Rule 34.1.1(2) as follows so that firefighting water supply standards would apply to habitable budlings in denser developed areas, that is, the Settlement and Bush Settlement management areas:

> *34.1 Permitted Activities (All Management Areas)*
> *34.1.1 Water supply systems complying with the following conditions:*
> *1. …*
> *2. Settlement Management Area and Bush Settlement Management Area: Every habitable building shall be provided with a water supply adequate for firefighting purposes in accordance with the New Zealand Fire Service Firefighting Water Supplies Code of Practice SNZ PAS 4509: 2008*

It is further proposed to delete the firefighting requirement for community water supply systems in 34.1.2(1), as this is considered addressed by the proposed requirement for habitable buildings in the Settlement Management Area and Bush Settlement Management Area.

The following table assesses these changes.

	Option 1: Retain the current provisions. • Firefighting water supply performance standards apply at subdivision, to residential units in Residential Zones and papakāinga, but not to land use in Rural Zones. • Policy 13.2 is retained in the Lakes A Zone, providing direction not to restrict re-vegetation and afforestation to avoid fire risk, but to rely on firefighting, fire prevention and evacuation.	Option 2: Make the following amendments to further address wildfire: • Include a definition for wildfire. • Include new Policy NH-P5 in the Natural Hazards chapter to require firefighting water supply (in accordance with the code of practice) in denser populated zones and papakāinga; and to encourage consideration of wildfire and mitigation when subdividing land in rural zones and in the rural-urban fringe. • Apply firefighting water supply performance standards to specific activities in Rural Zones that are more vulnerable to ignition, including residential units, so there is better alignment with the requirement for firefighting water supply at subdivision. However, limit the requirements for firefighting water supply at subdivision and land use in Rural Zones to the Rural 2 Zone and Rural 3 Zone (and papakāinga), consistent with proposed Policy NH-P5. • Include Wildfire in Planting Principles for Pukehāngi Heights Development Area. • In the Lakes A Zone, delete Policy 13.2 and instead apply Policy NH-P5. • In the Lakes A Zone, require firefighting water supply for habitable buildings as a performance standard in the Settlement Management Area and Bush Settlement Management Area, consistent with proposed Policy NH-P5.
Relevant Objectives (as proposed to be amended)	*SDNH-O1: The risks from natural hazards to people, property and the environment associated with land use, subdivision and development are acceptable* *SDNH-O2: Land use, subdivision and development is resilient to the current and future effects of climate change*	
Efficiency and Effectiveness of Achieving Objectives	This option is less effective in achieving SDNH-O1 and SDNH-O2. Firefighting water supply and access standards apply only to Residential Zones and at the subdivision stage, which limits wildfire risk mitigation in Rural Zones where wildfire risk may be higher. Retaining Policy NH-P3 is simpler to implement – it allows decision makers to ignore wildfire risk when considering issues of revegetation and afforestation. However, it relies on reactive measures (evacuation and firefighting) rather than proactive risk reduction.	This option is more effective and efficient in achieving SDNH-O1 and SDNH-O2. • Applying firefighting water supply requirements (which include requirements for access to the water supply) to specific activities in densely populated rural zones and to habitable buildings in the Settlement Management Area and Bush Settlement Management Area provides for preparedness for wildfire response, focusing on higher risk activities and areas. • Removing firefighting water supply requirements at subdivision for the Rural 1 and Reserve 1 Zone better targets requirements to areas of highest risk (that is, more densely populated areas). • The deletion of Policy 13.2 allows the balancing of proactive consideration of wildfire mitigation in the context of revegetation and afforestation, with other objectives relating to natural character and outstanding landscapes. • The addition of a wildfire definition and supporting policies further clarifies and strengthens the risk management framework.
Costs and Benefits	**Costs** The focus on subdivision for firefighting water supply means there can be a situation where a residential unit must provide firefighting water supply due to a subdivision consent notice, while a neighbouring dwelling—on a lot subdivided prior to such requirements—may not be subject to the same obligation. This inconsistency is inequitable.	**Costs:** Potential additional compliance costs to provide firefighting water supply in Rural 2 and 3 Zones (e.g. installing firefighting water tanks). **Benefits:** - Improved emergency response capability. - Reduced risk to life, property, and the environment from wildfires. - Greater clarity and consistency in applying hazard mitigation standards. - Alignment with climate resilience objectives.
Risks of acting or not acting if insufficient information	The degree of risk from wildfire is difficult to estimate. This option maintains the status quo without additional costs, but the costs are imposed inconsistently.	This option provides for a more coherent set of rules to require firefighting water supply in denser populated areas – leading to some additional costs in the context of uncertain, but increasing, wildfire risk.
Conclusion	Option 1 does not adequately address the risk of wildfire in Rural Zones and is the least appropriate to achieve the proposed objectives.	**Option 2 is the most appropriate option.** It supports a proactive, risk-based approach to wildfire management, improves alignment with natural hazard and climate resilience objectives, and ensures consistent application of mitigation standards across relevant zones.

8. Ngā Ripa Hapa - Fault Rupture

8.1 Scope of Plan Change for Fault Rupture and Summary of Proposed Changes

This plan change is intended to provide an opportunity for a full review of the District Plan provisions relating to fault rupture.

The following key changes are proposed:

- Removing the mapping of active fault traces and fault avoidance areas from the District Plan.
- Retaining the land use rules for fault avoidance zones but amending the wording so that the rules can stand alone without mapping in the District Plan.
- Adding a policy to the Natural Hazards Chapter that refers to the management of fault hazards through land use rules and subdivision.
- Extending the land use rules and the policy for fault rupture to the Lakes A Zone.

Further detail about the changes proposed, and the background and reasons for the proposed changes is provided below.

8.2 Fault Rupture Hazards affecting the Rotorua District

Tectonic processes can cause the ground surface to break and tear. These 'ruptures' tend to occur repeatedly at the same location, creating signs (traces) in landform that mark where fault rupture is more likely to occur again in the future.

The Rotorua District contains a dense system of NE-SW trending faults. The Ngākuru segment, located south of Rotorua city, has the highest density of active fault traces in New Zealand. In the Rotorua District, faulting is also complex with clusters of numerous short fault traces assumed to merge at depth into a lesser number of major faults. When the main fault plane ruptures, not every individual trace at the surface associated with it will rupture. Individual fault traces at the surface tend to have low to moderate slip rates (activity) compared to the fastest moving faults in New Zealand ((Morgenstern and Villamor, 2025, Villamor et al, 2010).

The District Plan contains active fault mapping based on a 2010 GNS study. However, the most up-to-date property-level mapping is contained within GNS's High Resolution Active Faults Database (NZAFD). This is a national database of geospatial data and attribute tables that describe the location and characteristics of known active faults, compiled from various studies. The NZAFD identifies the location of fault traces as well as buffers around them (known as Fault Avoidance Zones or FAZs) to account for the potential zone of intense deformation and secondary ruptures. The location of these buffers / FAZs in the Rotorua district is illustrated in Figure 7.

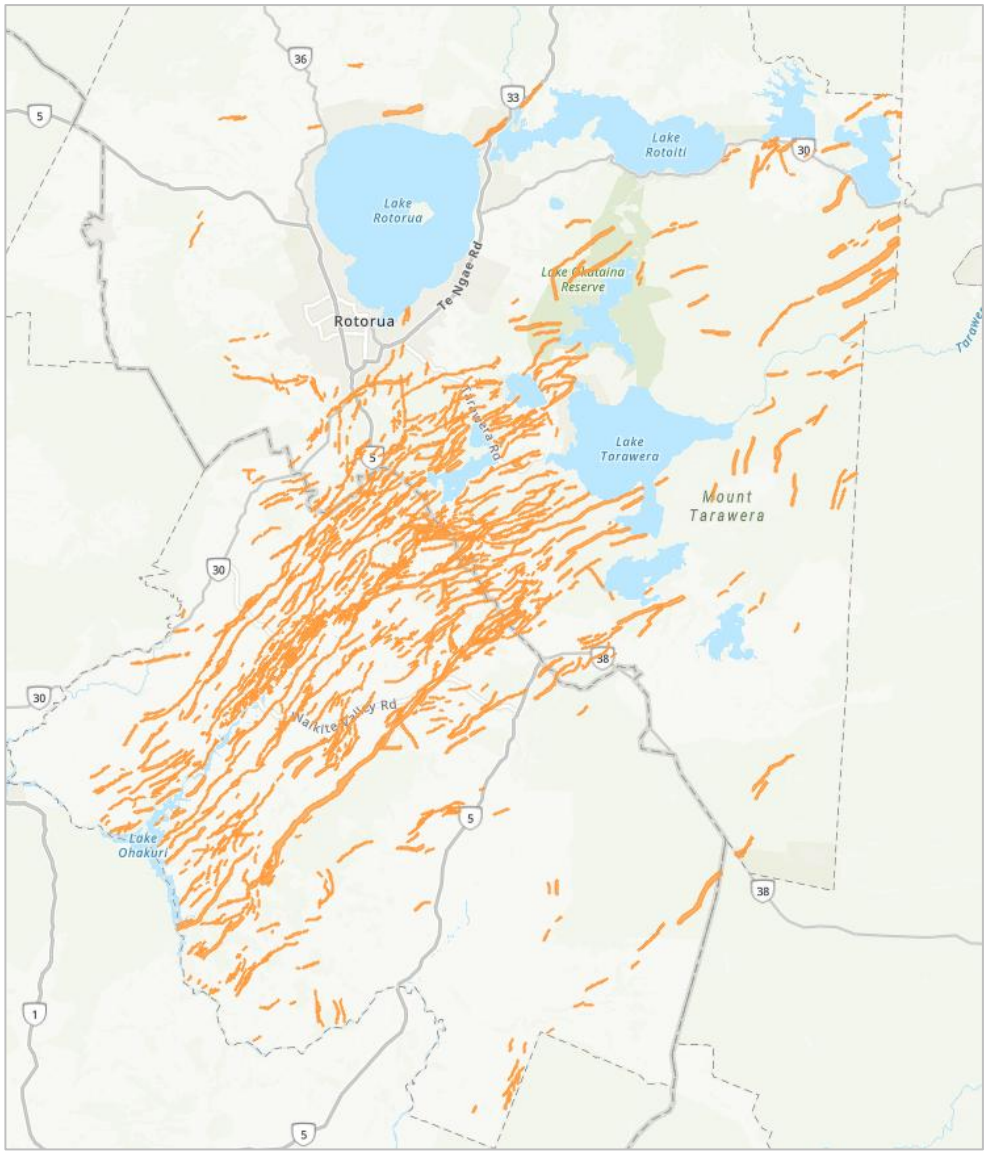


Figure 7 7 Fault Avoidance Zones for Rotorua District sourced from the New Zealand Active Fault Database

The update to the NZAFD to include mapping for Rotorua was funded by RLC in response to concerns about the accuracy of the District Plan mapping. This update considered landform information provided by recent LiDAR and also fault studies by GNS and development consultancies (Morgenstern and Villamor, 2025).

The NZAFD contains information on the average recurrence intervals of active faults, where available. The recurrence interval is a measure of the likelihood of fault rupture. Faults with shorter average recurrence intervals are generally more likely to rupture than faults with longer recurrence intervals (Kerr et al., 2003). This information assists in considering risk and is used in national guidance, as discussed below. However, most active faults identified in the NZAFD for the Rotorua District do not have recurrence intervals assigned, as illustrated in Figure 8.

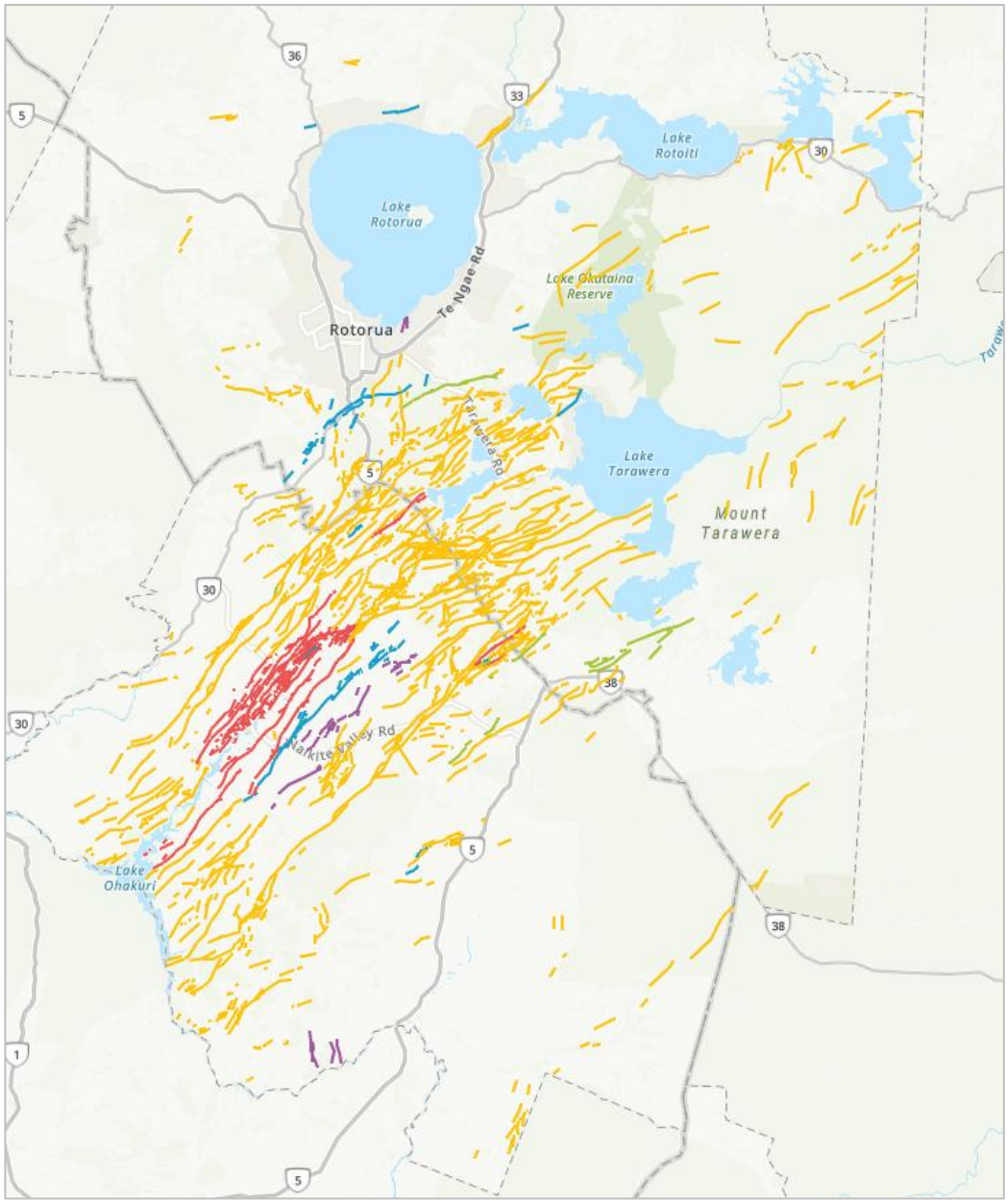


Figure 8 8 Recurrence Interval Class of Fault Traces in the Rotorua district. Yellow = unassigned, Purple = Class 1 (≤ 2,000 years), Green = Class II (>2,000 years to ≤3,500 years), Red = Class III (>3,500 years to ≤5,000 years), Blue = Class IV (>5,000 years to ≤10,000 years).

Of all the land identified in FAZs in the district, 83% of the area is associated with faults with no return interval assigned. Of the 17% of land in FAZs for which a recurrence interval is assigned:

- 12% (2.0% of the total FAZ) is for faults assigned recurrence interval I (≤ 2,000 years)
- 14% (2.4% of the total FAZ) is for faults assigned recurrence interval II (> 2,000 years to ≤ 3,500 years)
- 51% (8.7% of the total FAZ) is for faults assigned recurrence interval III (> 3,500 years to ≤ 5,000 years)
- 24% (4.1% of the total FAZ) is for faults assigned recurrence interval IV: (> 5,000 years to ≤10,000 years)

The NZAFD also contains information about the extent to which fault rupture is concentrated or distributed. For a given displacement, the amount of deformation at a specific locality is less within a

distributed rupture zone where displacement is spread out, than it is within a narrow zone where rupture is concentrated. The relative fault rupture hazard is therefore less within a zone of distributed deformation than it is within a narrow, concentrated zone (Van Dissen et al., 2011).

It should also be noted that fault mapping has limitations for the following reasons (Morgenstern and Villamor, 2025):

- Landscape processes (erosion and sedimentation) modify the topographic expression of a fault, making faults harder to locate.
- Additionally, volcanic deposits from the Ōkataina Volcanic Centre and from Taupō eruption have buried fault surface expression.
- It can be difficult to interpret faults in areas of dense vegetation.
- Past development can obscure the signatures in the natural landscape.

8.3 Fault Rupture Risk

8.3.1 Fault Rupture Risk – Potential Consequences and Land Use Influences

The displacement of the ground surface during the rupture of an active fault can cause damage to buildings, infrastructure and other structures. It can also result in potential deaths or injuries because of structural damage or failure. These are low-probability but potentially high-consequence events.

Key ways in which land use can influence risk (and potential matters for management) are:

- **Changing exposure**

  The location of vulnerable activities and assets including buildings and infrastructure determines the exposure to fault rupture hazards.

- **Building and Infrastructure Design**

  Design influences vulnerability. For example, it was found that single-story, regularly shaped, timber-framed houses fare well in response to significant coseismic strains near faults in the Kaikoura earthquake (Van Dissen et al., 2019).

8.3.2 Fault Rupture Risk Assessment under the Bay of Plenty Regional Policy Statement

The BOPRPS only applies to Bay of Plenty Region but, for consistency, its method for risk assessment is considered for fault rupture in the whole Rotorua District.

As noted above, the natural hazard risk management approach in the BOPRPS is intended to categorise risk at the 'hazard zone' scale for determining the risk management outcomes sought under Policy NH 3B. Essentially, hazard zones with low risk should be managed to keep the risk low; hazard zones with medium risk should be managed to reduce risk to as low as reasonably practicable; and hazard zones with high risk should be managed to reduce the risk.

Risk assessments can have different results, depending on how hazard zones are 'drawn' for the assessment. If each section of FAZ around a defined fault trace is considered a separate hazard zone, the risk level associated with most fault traces is generally expected to be medium or low in terms of the consequences to buildings, and health and safety (which are considered the consequences most relevant to a District Plan):

- Under the primary analysis (which uses a matrix of consequences and event probabilities), the risk level for most FAZs is expected to be no more than 'medium'. This is because, even if the consequences were 'catastrophic', the average recurrence interval (here, used to indicate

event likelihood) would need to be less than 1,000 years to meet high risk (i.e. a subset of class I RI). There would also need to be special circumstances to result in 'catastrophic' consequences for buildings, such as compromise of a critical building or social/cultural building.

- Under the secondary analysis, the *average* annual fatality risk for people (and for people in care considered separately) exposed in the hazard zone would need to exceed $1x10^{-4}$ (1-in-10,000-year) for high risk. Fault rupture itself has a probability up to ten times higher than this. However, when other factors are taken into account, including the past performance of typical New Zealand buildings affected by fault rupture with respect to life safety, [1] and time that residents spend away from a building, it is considered that special circumstances would be needed to trigger high risk, such as a substantial proportion of buildings in a FAZ that are not typical timber-framed buildings and may not respond as well to fault rupture.

Additional information on recurrence intervals would provide more confidence to this assessment but is not currently available.

8.3.3 Fault Rupture Risk Assessment under National Guidance

National guidance for planning for the development of land on or close to active faults was published by the Ministry for the Environment in 2003 (Kerr et al, 2003). The guidance promotes a risk-based approach, focusing on life safety, and consists of:

- Identification of faults and associated FAZs to account for uncertainty in the location (consistent with the mapping undertaken for the Rotorua District).
- Identification of the fault recurrence interval, which is used as an indicator of the likelihood of future fault rupture.
- Use of Building Importance Categories to make decisions about the appropriateness of different types of buildings in an FAZ. The higher the importance category, the longer the acceptable recurrence period. Buildings with the lowest importance category are not restricted.

The guidance accepts that different decisions may be appropriate for development on previously subdivided or developed sites than on greenfield sites. For example, the minimum acceptable recurrence interval suggested for timber framed single-storey residential building (class 2a) in an FAZ is >3,500 years on a greenfield site and >2,000 years on previously developed or subdivided sites.

The guidance also supports more nuanced decision-making that considers fault complexity (a fault rupture with a wide and distributed deformation is lower risk than a narrow, well-defined fault line) and engineering design. However, there is a lack of detail on how to apply consideration of fault

[1] Rupture on the Darfield Fault in Canterbury affected about a dozen buildings and none collapsed. These were mainly relatively flexible single-story timber-framed houses and farm sheds. From a life-safety standpoint, all these buildings were stated to perform satisfactorily (Van Dissen et al., 2011). The 2016 Kaikōura earthquake generated about 220 km of surface fault rupture of varying types and degrees. About a dozen buildings – mainly residential (or residential-type) structures comprising single-story timber-framed houses, barns and wool sheds with lightweight roofing material – were directly impacted by surface fault rupture with the severity of damage correlating with both local discrete fault displacement and local strain. However, none of these buildings collapsed and, again, from a life safety perspective all were said to perform satisfactorily (Van Dissen et al., 2019).

complexity and engineering design. Therefore, it is not surprising that practice has focused on avoidance in FAZs consistent with the RI thresholds prescribed.

8.3.4 Fault Rupture Risk Assessment under the NPS for Natural Hazards Consultation Material

Risk assessment in the consultation material for the National Policy Statement (NPS) for Natural Hazards, like under the national guidance, is undertaken at a site-specific level. Using the consequence descriptions in the consultation material, fault rupture beneath a building is likely to cause either 'major' consequences (loss of use and substantial repair) or 'catastrophic' consequences (requiring demolition or rebuild). These outcomes are considered likely even where buildings are designed to meet the Building Code, as Code-compliant design for low probability events typically prioritises life safety over minimising damage or repair needs.

The matrix indicates that both major and catastrophic consequences correspond to a 'medium' risk rating, regardless of the probability (e.g. the recurrence interval of the fault is > 5,000 years). Notably, this risk rating also appears unchanged regardless of the building's value or importance.

Under the consultation material, a 'medium' risk also equates to a 'significant risk'—a matter of national importance requiring management. The material does not specify management objectives for significant risk, though it could be implied that risk mitigation or reduction is expected. This contrasts with existing national fault rupture guidance, which typically only seeks risk reduction for faults with recurrence intervals over 5,000 years if the proposed building will host crowds, house high-value contents, or serve post-disaster functions.

This treatment also differs from national approaches to other low-probability but high-impact hazards, such as:

- **Earthquakes**
  NZS 1170 sets out earthquake design standards for Building Code compliance using two key concepts: the ultimate limit state (ULS)—the maximum seismic action a structure must withstand to preserve life (accepting that structural damage may occur); and the serviceability limit state (SLS)—the point beyond which a building is no longer fit for use. A standard residential building with a 50-year design life must be designed for a 1-in-500-year ULS event. Even buildings with post-disaster functions (e.g. hospitals) designed with a 100-year life are only required to withstand a 1-in-2500-year event.
- **Liquefaction**
  MBIE's guidance on liquefaction (2010, updated 2012) also uses a 1-in-500-year (0.2% AEP) earthquake as the basis for ULS design for residential buildings.

Given the consultation material's lack of statutory weight and the fact it has not yet undergone formal consultation, Rotorua Lakes Council has given it limited weight in its assessment.

8.3.5 Fault Rupture Risk Assessment – Comments and Conclusions

Fault rupture risk under the BOPRPS, which apply at the hazard zone–scale, indicates that land use in the buffer areas around active faults in the Rotorua District is likely to often present low to medium risk to land use, even without specific design, due to long recurrence intervals and the expected life safety performance of typical buildings. This suggests that intervention to reduce risks should be for the objective to keep risks low or as low as reasonably practicable. However, limited data on the

probability of fault rupture limits the confidence in this conclusion. Special circumstances, such as location of a critical facility in an area susceptible to fault rupture, could also trigger higher risk.

National guidance (Kerr et al., 2003) provides a more detailed, site-specific method that considers both fault recurrence interval and building importance. This enables a proportionate assessment of fault rupture risk and is considered appropriate for site-level decisions.

8.4 Regional Direction for District Plan Fault Rupture Provisions

We have not identified any specific regional plan or regional policy statement provisions (in addition to that discussed for all hazards in section 3) to guide the development of the District Plan for fault rupture.

8.5 Existing District Plan Provisions for Fault Rupture

Mapping of active faults has been included in the District Plan since it was notified in 2012. As noted above, this mapping is based on GNS's 2010 study and includes buffer areas to account for the potential zone of deformation. These buffer areas were originally called the 'Fault Avoidance Zone' consistent with the national guidance terminology but were renamed the 'Fault Avoidance Overlay' for consistency with National Planning Standards terminology. In the hardcopy/static maps, fault mapping over the Lakes A Zones is shown differently, with high transparency, which creates ambiguity about the status of the mapping.

The main part of the District Plan (outside of the Lakes A Zone) has no specific objectives or policies for faults.

Fault rupture hazards are addressed at subdivision through a general performance standard SUB-S9(1)(a), which requires that 'All sites within the subdivision have an area with a foundation suitable for the intended future use, which will be free from erosion, subsidence and slippage'. Consideration at subdivision provides the opportunity to identify issues early and ensure reasonable expectations for future development. The area of application of these standards is not restricted to the mapped fault avoidance overlay. However, our discussion with those involved in consenting suggests that the mapped fault avoidance area provides the usual trigger for consideration.

Rules NH-R1 to NH-R3 provide the regime in the main part of the District Plan for managing buildings in the Fault Avoidance Overlay at building stage:

- Additions to buildings in the Fault Avoidance Overlay are permitted activities (NH-R1(1)) (but also refer to management under the Building Act).
- New buildings of 'low importance' are also permitted (NH-R2). The District Plan defines such buildings as 'buildings posing low risk to human life and the environment, and a low economic cost, should the building fail. These are typically small (less than 30m^2) non-habitable buildings such as sheds, barns, and the like, that are not normally occupied, though they may have occupants from time to time.'
- Existing buildings can be replaced as a permitted activity, provided the building footprint is not extended (NH-R(1)). This provides a simpler approach to existing use rights than relying on section 10 of the RMA.
- New buildings or replacement buildings that extend the building footprint are restricted discretionary activities with discretion reserved over adverse effects from natural hazards or the worsening of any hazard identified on the planning map are managed (NH-R1(2), NH-

R3). Restricted discretionary activities also require an assessment by a geotechnical engineer of the fault location, potential recurrence interval and any design/location/use restrictions.

It is presumed that these rules encourage developers to avoid locating buildings in the Fault Avoidance Overlay, but this is difficult to quantify. Where development is sought in the overlay, our review of previous resource consents confirms that practice relies on the Ministry for the Environment's 2003 guidance. Fault location and recurrence intervals have been established by trenching or landscape analysis to locate and date past movements. Often, but not always, the recurrence intervals assessed were long enough to enable the development to proceed without exceeding the national guidance thresholds.

In the Lakes A Zone, Objective 18 (proposed to be deleted, except in relation to volcanic hazards) may be considered to address fault rupture hazard. This objective refers to 'seismic activity in active faults,' but 'seismic activity' is usually used to refer to earthquake shaking.

> *Limited risks to human occupation and activity caused by the risks posed by natural hazards including:…*
>
> *d) Seismic activity in active fault lines*

Policy 13.1 (proposed to be limited to volcanic activity, erosion and sedimentation) also may be considered to address active faults under the term 'seismic activity':

> *P13.1 To recognise that hazards arise from volcanic activity, seismic activity, geothermal activity, flooding, fire, erosion and sedimentation and apply measures that reduce risk to people and property.*

The explanation of the objectives and policies (section S5.13, which is proposed to be amended as explained above) states that avoidance will not be used for faultlines. However, the last sentence suggests that it could be the earthquake (shaking) hazard rather than the fault rupture that is not to be avoided:

> *There is a wide range of possible natural hazards and some created hazards that constrain development. The lakes area has a significantly large number of faultlines, the avoidance of which by development, would be impossible. As such, Council's approach is to keep development at a relatively low density, to apply the provisions of the Building Act 1991 and implement evacuation procedures rather than prohibit further development in the area. It is not considered practical to avoid the effects of earthquake and volcanic eruptions other than timely evacuation.*

While there is some ambiguity around whether the policies address fault rupture, the performance standards for building platforms in Rule 6 require that they are located 'clear of any areas of instability or known natural or artificial hazard'. This is considered to include active faults.

8.6 Management of Fault Rupture Risks outside the District Plan

8.6.1 Building Act and Building Code

The requirements of clause B1 (Structural Stability) of the Building Code are relevant to building on or near faults if the building work affects structural elements or loads. However, implementation of this clause is complex. The scrutiny of compliance provided by the building consent process also does not apply to all buildings; some building types, such as unplumbed sleepouts, are exempt.

The objective clause B1 is set out in B1.1:

> *(a) safeguard people from injury caused by structural failure,*
>
> *(b) safeguard people from loss of amenity caused by structural behaviour, and*
>
> *(c) protect other property from physical damage caused by structural failure.*

The functional requirement is that 'Buildings, building elements and sitework shall withstand the combination of loads that they are likely to experience during construction or alteration and throughout their lives' (B1.2).

In terms of performance, clause B1.3.1 requires:

> *Buildings, building elements and site work have a low probability of rupturing, becoming unstable, losing equilibrium, or collapsing during construction or alteration and throughout their lives*.

Clause B1.3.3 further requires:

> *Account be taken of all physical conditions likely to affect the stability of buildings, building elements and site work, including*:
>
> *(d) earth pressure*
>
> *…*
>
> *(f) earthquake*
>
> *…*
>
> *(m) differential movement*

Sites affected by FAZs are understood not to meet the requirements of 'good ground' under New Zealand Standards. This means that the common compliance pathways for clause B1 using acceptable solutions are unlikely to be available. Verification methods also do not specifically address active faults. Therefore, applications for building work in a FAZ relevant to clause B1 will need to follow an alternative solution based demonstrating the performance of the building. This will likely require collaboration and dialogue between designers and engineers as recommended by the Ministry of Business, Innovation and Employment (Improving_Collaboration_Between_Architects_and_Engineers.pdf).

RLC supports reference to the Ministry for the Environment guidance to help define the requirements in clause B1 in the context of fault rupture (although it recognises it may not be appropriate in every circumstance). This guidance provides a basis for demonstrating compliance using a risk-based approach, based on the fault's recurrence interval and building importance level. Specific building design and justification may not be needed where the recurrence interval is unknown or less than that suggested for the building importance level in the Ministry's guidance.

Alterations to existing buildings are worth specific mention given that there are existing buildings affected by FAZs. In addition to the general requirement to comply with the Building Code in section 17, alterations are also subject to section 112, which states:

> ***112 Alterations to existing buildings***
>
> *(1) A building consent authority must not grant a building consent for the alteration of an existing building, or part of an existing building, unless the building consent authority is satisfied that, after the alteration,—*
>
> *(a) the building will comply, as nearly as is reasonably practicable, with the provisions of the building code that relate to—*

(i) means of escape from fire; and

(ii) access and facilities for persons with disabilities (if this is a requirement in terms of section 118); and

(b) the building will,—

(i) if it complied with the other provisions of the building code immediately before the building work began, continue to comply with those provisions; or

(ii) if it did not comply with the other provisions of the building code immediately before the building work began, continue to comply at least to the same extent as it did then comply.

For completeness, it is also noted that that sections 71 to 74 of the Building Act are understood not to apply to earthquakes and their effects (MBIE, 2003). These deal with when a building consent authority can grant building consent for land subject to natural hazards, and hazard notices on property titles.

8.6.2 Section 106 RMA

As noted in relation to other hazards, section 106 of the RMA enables a consent authority to refuse subdivision consent or impose conditions if it considers there is a significant risk of natural hazards; and a similar provision is being considered for land use consents under the recent RMA Amendment Bill. However, significant risk has not been defined in the RMA.

8.7 Issues Identified with Fault Rupture Provisions

The following key concerns or issues were identified and have informed the proposed changes:

1. **Inaccurate and outdated mapping:**
   The District Plan maps fault traces and Fault Avoidance Areas based on older data that has since been superseded by a significant update to the New Zealand Active Fault Database (NZAFD). The current mapping is less accurate, includes inactive faults, and applies broader buffers than necessary.
2. **Overlap with the Building Act**:
   Both the District Plan and Building Act address risks to buildings from fault rupture, raising questions about duplication. Recent and proposed exemptions from building consent and district plan rules for small dwellings also create uncertainty about the respective roles of the District Plan and Building Act frameworks.
3. **Inefficiency of land use rules:**
   Aside from 'buildings of low importance', the current rules apply a uniform approach to buildings in Fault Avoidance Areas, without further tailoring to factors that affect risk, such as building design, building use and likelihood of fault rupture.
4. **Costs of site investigation:**
   There is often no recurrence interval information for faults shown on the maps. Site-specific investigations to obtain this information (e.g. trenching) are expensive and not always feasible at the subdivision or land use stage.
5. **Clarity of policy:**
   As with other geological hazards, there is a lack of detailed policy to link to methods.

6. **Lack of alignment in Lakes A Zone:**
   The current approach to managing fault rupture hazards in the Lakes A Zone differs from the rest of the District Plan. Local planners have recommended greater alignment to improve clarity, consistency, and efficiency.

8.8 Proposed Changes to Fault Rupture Policies, Rules and Mapping

8.8.1 Remove Mapping of Fault Traces and Fault Avoidance Area

In its recent update to the active fault database, GNS has been able to locate faults with greater certainty, narrow the width of FAZs, and remove some fault traces on the basis that they do not meeting the criteria for an active fault. This updated mapping is not reflected in the District Plan maps. Figure 9 illustrates differences between the District Plan maps and the national database:

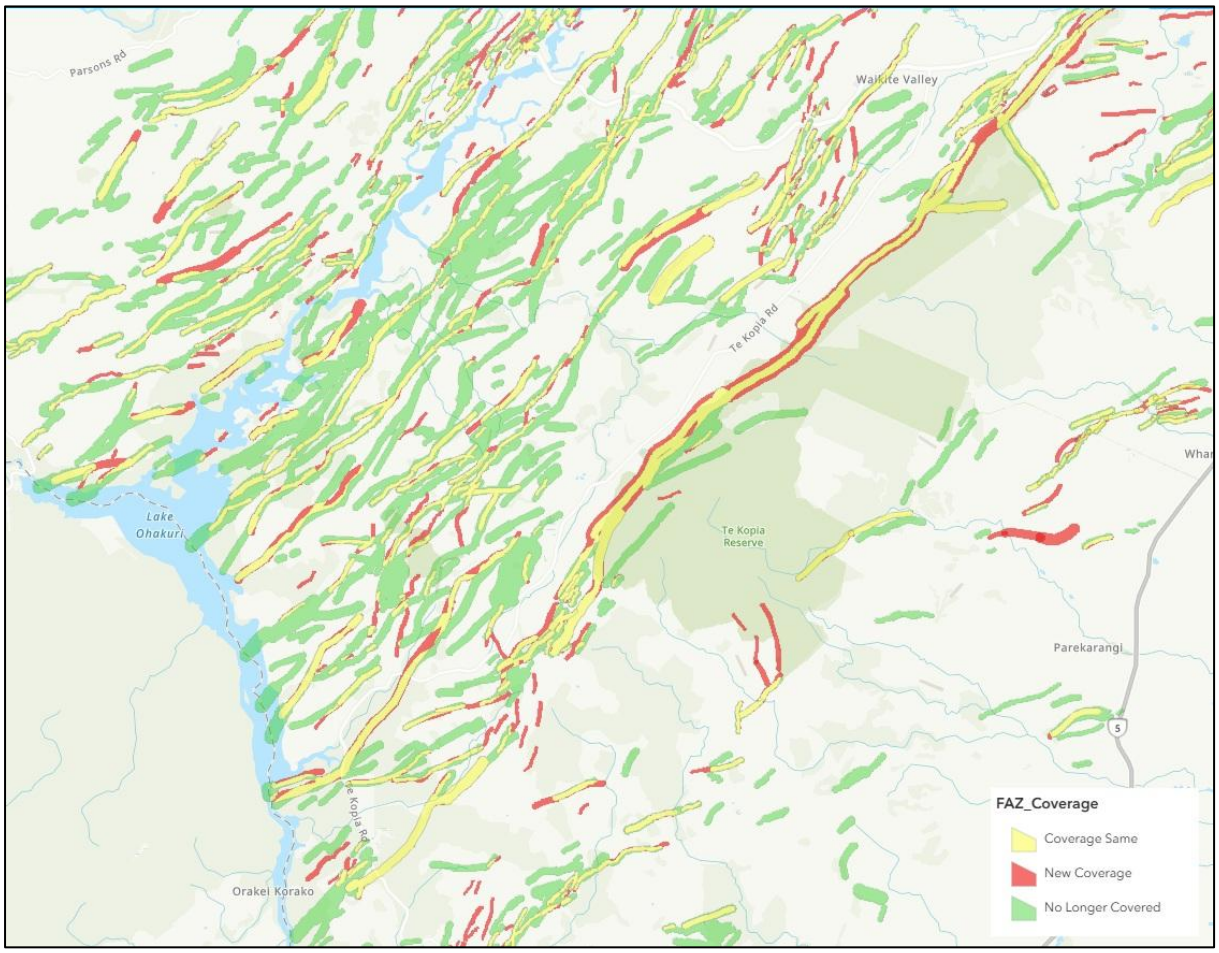


Figure 9 Comparison of the District Plan Fault Avoidance Overlay and Fault Avoidance Zones in the NZAFD for Part of the Rotorua District

Two options were identified:

1) **Update maps and rename the overlay**

   Update the fault traces and buffer areas consistent with the recent work published in the NZAFD. The name 'Fault Avoidance Area Overlay' (or Fault Avoidance Zone as it is known in the national guidance) is considered misleading because avoidance of land use may not always be necessary to achieve an acceptable level of risk and would be changed to 'Fault

Rupture Hazard Overlay'. The inclusion of the 'rupture' in the title may also help to educate about the type of hazard being managed.

2) **Remove maps and define a Fault Rupture Hazard Area to which rules apply**

Remove fault mapping from the District Plan and reframe rules NH-R1 to NH-R2 to target a 'described' fault rupture hazard area, rather than a formal overlay. Fault Rupture Hazard Area would be defined as:

Fault Rupture Hazard Area	*the area around an active fault trace that includes the likely area of fault rupture plus an additional width of at least 20m on either side to allow for secondary ruptures and uncertainty in the location of future deformation.* *Note: The Fault Avoidance Zones identified in the New Zealand Active Faults Database assist to identify the Fault Rupture Hazard Area but may be supplemented with other information.*

The definition is intended to align with the NZAFD fault avoidance zones. It is anticipated that the NZAFD would provide the primary information to locate the fault rupture hazard area. However, this information could be supplemented with site-specific information, such as the results of trenching.

The rules would be updated as shown in the following rule table. It is not considered necessary to specify which zones the Fault Rupture Hazard area affects, so this is proposed to be deleted as well.

Fault ~~Lines~~Rupture		
NH-R1	***Additions to existing buildings or replacement buildings in the ~~Fault Avoidance Area Overlay~~ Fault Rupture Hazard Area***	
Applicable Spatial Layers *~~Fault Avoidance Area~~Fault Rupture Hazard Area ~~in:~~* *~~Residential Zones~~* *~~Industrial Zones~~* *~~Business and Innovation 1 Zone~~* *~~All Rural Zones~~* *~~Reserve 1 Zone~~*	***1. Activity Status:*** *Permitted* ***Performance Standards:*** *a. Replacement buildings within the ~~fault avoidance area~~Fault Rupture Hazard Area shall be within the existing building footprint.*	***2. Activity Status:*** *Restricted Discretionary* ***Where:*** *Compliance is not achieved with the performance standards for NH-R1(1).* ***Matters of Discretion:*** *a. The extent to which natural hazard risks are avoided or mitigated and ~~Adverse effects from natural hazards or~~ the worsening of any hazard ~~identified on the planning maps are managed~~.* *b. In order to assess the risk arising from locating a habitable building within a ~~fault avoidance area~~Fault Rupture Hazard Area, a natural hazard assessment report from a suitably qualified geotechnical engineer shall be provided for new buildings located within the ~~fault avoidance area~~Fault Rupture Hazard Area with this identifying the potential location of*

		the fault line, its recurrence interval and any subsequent building design and location requirements or restrictions on use.
NH-R2	***Low importance buildings in the ~~Fault Avoidance Area Overlay~~ Fault Rupture Hazard Area***	
Applicable Spatial Layers *~~Fault Avoidance Area~~Fault Rupture Hazard Area ~~in:~~* *~~Residential Zones~~* *~~Industrial Zones~~* *~~Business and Innovation 2 Zone~~* *~~All Rural Zones~~* *~~Reserve 1 Zone~~*	***1. Activity Status:*** *Permitted*	
NH-R3	***New buildings in the ~~Fault Avoidance Area Overlay~~ Fault Rupture Hazard Area***	
Applicable Spatial Layers *~~Fault Avoidance Area Overlay (2010)~~ Fault Rupture Hazard Area ~~in:~~* *~~Residential Zones~~* *~~Industrial Zones~~* *~~Business and Innovation 23 Zone~~* *~~All Rural Zones~~* *~~Reserve 1 Zone~~*	***1. Activity Status:*** *Restricted Discretionary* ***Matters of Discretion:*** *a. The extent to which natural hazard risks are avoided or mitigated and ~~Adverse effects from natural hazards or~~ the worsening of any hazard ~~identified on the planning maps are managed~~; and* *b. In order to assess the risk arising from locating a habitable building within a ~~fault avoidance area~~Fault Rupture Hazard Area, a natural hazard assessment report from a suitably qualified geotechnical engineer shall be provided for new buildings located within the ~~fault avoidance area~~Fault Rupture Hazard Area with this identifying the potential location of the fault line, its recurrence interval and any subsequent building design and location requirements or restrictions on use.*	

Option 2 is the proposed option, for the reasons explained in the table below.

	Option 1: Retain and update the District Plan mapping of fault traces and the buffer overlay (renamed to Fault Rupture Hazard Overlay)	Option 2: Remove fault traces and overlay from the District Plan maps and instead describe where the rules apply
Relevant Objectives (as proposed to be amended)	*SDNH-O1: The risks from natural hazards to people, property and the environment associated with land use, subdivision and development are acceptable* *SDNH-O2: Land use, subdivision and development is resilient to the current and future effects of climate change*	
Efficiency and Effectiveness of Achieving Objectives	The area where the fault rupture hazard rules apply is more certain and less open to interpretation, which may reduce conflict and improve efficiency. However, specific activities within the overlay would require resource consent notwithstanding if site specific studies were to establish, they are outside the area potentially subject to fault rupture, leading to inefficiencies.	Allows for flexibility to use the most up-to-date information in determining where rules apply. For example, trenching to establish the location of a fault. Removal of the mapping from the District Plan increases the risks that the issue is missed by landowners and designers and they only become aware later in the development process, leading to inefficiencies. However, this is mitigated by provision of information on LIMs and Council's map viewer 'geyserview'.
Costs and Benefits	The management approaches (rules) are similar under both options and have similar costs and benefits. However, site specific studies could identify changes to the mapping (such as a narrowing of the buffer area), which would not be incorporated into the mapping until a further plan change. In the meantime, the land would continue to be shown as affected on District Plan maps and subject to the active fault rules and LIMs. This has implications for cost, efficiency and equity.	
Risks of acting or not acting if insufficient information	Fault rupture hazard mapping is not anticipated to change as much as mapping of other hazards, such as flood hazards, now that the major update has been completed using modern LiDAR. However, further information may continue to arise e.g. from trenching. Removing the maps and relying instead on a description to apply the rules allows the rules to be targeted to the areas of concern.	
Conclusion	Overall, option 1 is considered less appropriate.	Option 2 is considered more appropriate.

8.8.2 Include a Fault-Specific Policy

It is proposed to add a policy in the Natural Hazards chapter as follows as set out below. This is intended to clarify rather than change existing practice.

Fault Rupture

Policy NH-PAA

Manage the risks to people and property associated with fault rupture by requiring an assessment of fault rupture risk and mitigation options for:

1. *Subdivision to facilitate building on land susceptible to fault rupture.*
2. *New buildings in areas susceptible to fault rupture.*

8.8.3 Other Options Considered

Existing land use rules NH-R1 to NH-R3 for building on or near active faults are considered to remain appropriate, subject to refinement to allow for removal of fault mapping from the District Plan.

An alternative option identified was to remove these rules on for the reason the Building Code also manages structural stability. However, feedback provided by planners was that the District Plan rules alert to the issues ahead of detailed design, and that removing the rules may lead to wasted investment in design and reduced efficiency.

The Amendments to the Building Act proposed by the Building and Construction (Small Stand-alone Dwellings) Amendment Bill further support retaining rules in the District Plan. This Bill proposes to exempt small stand-alone residential units from the requirement to obtain building consent and apply limits to this exemption relating to only natural hazards defined under the Building Act (which do not extend to fault rupture). However, there are also impending exemptions for small stand-alone dwellings from district plan rules, that may also need to be considered.

Another option identified was to develop more nuanced triggers for resource consent, based on fault recurrence interval and building importance level, consistent with the Ministry guidance (currently the rules refer only to 'buildings of low importance' with other buildings subject to the same rules). However, this option was rejected because most faults do not currently have a recurrence interval.

Based on current information, retaining the existing land use rules is considered the most appropriate option. However, these options are still considered to have some merit and may potentially need reconsideration following submissions.

8.8.4 Align Approach to Fault Rupture Hazards in the Lakes A Zone

It is proposed to extend the proposed active fault policy (NH-PAA) and existing land use rules in the main part of the District Plan (NH-R1 to NH-R3) to the Lakes A Zone. This would be implemented through stating, in relevant parts of the District Plan, including in the Lakes A Zone, that the whole Natural Hazards (NH) chapter applies to the Lakes A Zone, as explained above for flooding.

The explanation and principal reasons to the objectives and policies in the Lakes A Zone (S5.13) are also proposed to be amended as a consequence of limiting the objectives and policies to volcanic hazards, as explained above. This amendment is repeated here:

> *There is a wide range of possible natural hazards and some created hazards that constrain development. ~~The lakes area has a significantly large number of faultlines, the avoidance of which by development, would be impossible. As such,~~ Council's approach is to keep development at a relatively low density, to apply the provisions of the Building Act 1991 and implement evacuation procedures rather than prohibit further development in the area. It is not considered practical to avoid the effects of ~~earthquake and~~ volcanic eruptions other than timely evacuation.*

It is not, at this stage, proposed to amend the performance standards for building platforms in the Lakes A Zone, which require that building platforms are located clear of any areas of instability or known natural or artificial hazard. Rule 38 for subdivision in the Lakes A Zone would also continue to refer to the performance provisions for building platforms. Where this condition cannot be met the subdivision would be a discretionary or non-complying activity, depending on the zone.

These changes are assessed against the existing provisions in the following table.

	Option 1: Retain the existing provisions. • The outdated fault trace and FAZ mapping would remain over the Lakes A zone with high transparency. • The explanation to policies and objectives would continue to state that avoidance of faults is impossible in the Lakes A Zone due to the large number of faults. • However, performance standards for building platforms in Rule 6 require that they are located 'clear of any areas of instability or known natural or artificial hazard'. • The Building Code (Structural Stability) assists to manage fault rupture hazards. • Fault rupture hazards are considered at subdivision under performance standards.	Option 2: Align the approach to fault rupture in the Lakes A Zone: • Policy NH-PAA would apply to the Lakes A Zone. • Rules NH-R1 to NH-R3 would apply to manage buildings in the Fault Rupture Hazard Area. • Fault rupture hazards can still be considered at subdivision through the link to the building platform performance standard. • The Building Code (Structural Stability) remains relevant to the management of faults.
Relevant Objectives (as proposed to be amended)	*SDNH-O1: The risks from natural hazards to people, property and the environment associated with land use, subdivision and development are acceptable* *SDNH-O2: Land use, subdivision and development is resilient to the current and future effects of climate change*	
Efficiency and Effectiveness of Achieving Objectives	There is a lack of clarity about whether faults are to be managed under the District Plan. Performance standards addressing 'areas of instability or known hazard' lack of certainty. Ambiguity over the status of fault avoidance zones and fault trace mapping would remain in the Lakes A Zone, potentially causing confusion and inefficiencies for consenting. National guidance supports development over faults in low-risk circumstances. The promotion only of avoidance in the current explanation may have opportunity costs and is not considered an efficient way to achieve the objectives.	Improves certainty around how faults are managed through the District Plan. Allows for risk-based decision-making for building on or near active faults, consistent with the proposed objectives.
Costs and Benefits	The approach to fault rupture hazards is inconsistent across different parts of the Rotorua District, which can be seen as unfair.	
Risks of acting or not acting if insufficient information		
Conclusion	Option 1 is considered less appropriate.	Option 2 is considered more appropriate.

9. Ngā Matepā o te Tūāhua o te Whenua - Ground Condition Hazards (Liquefaction and Soft Soils)

9.1 Scope of Plan Change for Ground Condition Hazards and Summary of Proposed Changes

This plan change is intended to provide an opportunity for a full review of the District Plan provisions relating to ground condition hazards (including liquefaction and soft, compressible soils).

The key changes proposed are, in summary, to remove soft soil mapping from the District Plan and clarify practice, through a new policy, that ground condition hazards are to be assessed at subdivision, including in the Lakes A Zone.

The sections below set out the background to the proposed changes, further detail and an evaluation of the proposals.

9.2 Ground Condition Hazards affecting the Rotorua District

9.2.1 Introduction

Some ground conditions can be viewed as hazards because they present risks to buildings and infrastructure. Soft, compressible soils are one such hazard. These can undergo significant volume decrease, or compression, when subjected to load or stress, leading to settlement of structures and infrastructure built on or within these soils (Dellow, 2010).

Soft or compressible soils primarily include clayey and silty soils, peat and organic soils. Their formation usually involves the slow accumulation and layering of fine particles and organic matter, often in underwater or water-saturated environments. These fine particles can accumulate by sedimentation in still water bodies like lakes, or in waterlogged areas such as swamps and marshes.

The potential for liquefaction is another type of hazardous ground condition. Liquefaction is a process that occurs when loosely packed, water-saturated soils, typically sandy soils, lose their strength in response to intense ground shaking, such as during an earthquake. This loss of strength can cause the ground to deform and flow, leading to a range of phenomena including lateral spreading (ground movement along a slope), ground oscillation (shaking of the surface soil), sand boils or sand volcanoes (eruptions of water and sand at the ground surface), and even complete flow failures as landslides.

Three key elements are required for liquefaction to occur (Ministry for the Environment and Ministry of Business, Innovation and Employment, 2017):

1. Loose non-plastic soil (typically sands and silts)
2. Saturated soil, i.e. below the groundwater table
3. Sufficient ground shaking (a combination of the duration and intensity of shaking).

Because liquefaction requires specific soil and groundwater conditions to occur (given sufficient earthquake shaking), some types of landforms are more likely to be susceptible than others. These include the following relevant to the Rotorua District: areas alongside rivers, streams and lakes, estuaries and swamps, flood plains, and areas with poorly compacted fill.

9.2.2 Hazard mapping and identification

Soft/Compressible Soils

GNS mapped areas with potential for soft soils in the Rotorua district in 2010 using existing geological maps and a small number of site investigation reports (Dellow, 2010) and this work is included in District Plan maps (hardcopy map 209).

Four zones were mapped:

- Zone A – Areas of volcanic-derived rocks and soils.
- Zone B – Older sediments formed in a range of environments. Sediments with soft and very soft strengths at the time of formation are likely to have consolidated over time.
- Zone C – Undifferentiated Holocene alluvium (<10,000 years old). Sites from a range of environmental conditions are present and small areas of soft to very soft ground may be present as surficial layer in some places.
- Zone D – Holocene (<10,000 years) swamp deposits, lake or delta sediments.

The associated report notes that soft ground areas may still exist in all zones, although in Zones A, B and C these should be small in extent and at the surface. It, therefore, recommends that further site-specific investigation (using a scala penetrometer) be carried out at development stage in all zones.

Liquefaction

In 2021, Tonkin & Taylor Ltd. completed a liquefaction vulnerability assessment for the BOPRC (Tonkin & Taylor, 2021). This included mapping liquefaction vulnerability classes ‘’liquefaction damage is unlikely”, “liquefaction damage is possible” and “undetermined” for nearly all the Bay of Plenty region, as well as that part of the Rotorua district in the Waikato region. These maps are accessible to the public through RLC’s and BOPRC’s online mapping tools but have not been adopted in the District Plan.

Tonkin & Taylor describe their assessment as in general accordance with the 2017 national guidance document to a ‘level A’ (basic desktop) standard (MfE and MBIE, 2017). As a level A study, it does not precisely describe liquefaction vulnerability at a property scale. Its main role is to identify areas where there is a high degree of certainty that liquefaction is unlikely. However, most areas, including much of Rotorua city, were mapped as “undetermined”, meaning that there was insufficient information to determine whether they are prone to liquefaction or lateral spreading. Second most common is “possible” and very little has been identified as “unlikely”. Areas that are mapped as possible include areas signalled for greenfield development in the Future Development Strategy.

According to the national guidelines, more detailed assessments should support activities such as zone changes and most building consent applications for “undetermined” and “possible” areas.

The regional liquefaction susceptibility study’s identification of most areas as “undetermined” means a conservative approach is taken regarding liquefaction assessment at development stage. Many geotech reports contain full liquefaction assessments (to Level C or D as described in national guidelines) supported by new CPT data.

We are aware that a national liquefaction model is being developed for the Natural Hazards Commission, led by Tonkin & Taylor, intended for national loss modelling. It is hoped that this work may also provide more refined liquefaction susceptibility mapping that could reduce assessment costs for some sites by providing confidence to assess the site without expensive ground investigation techniques. However, this has yet to be confirmed.

Geotechnical Investigations and databases

It is also worth mentioning that site-specific ground condition data has been, and continues to be, collected to support building and resource consent applications. This data can help inform site-specific assessments of ground conditions in the vicinity. It can potentially also inform hazard susceptibility research and mapping at larger scales for city/district/regional studies, etc.

The New Zealand Geotechnical Database has been developed for the use of professional geotechnical and structural engineers to access geotechnical data shared by other engineers and their clients, and to share their own data in return.

Technical reviewers involved in processing consents have also collated data provided to support consent applications to help inform their input into the review process. Of the 348 geotechnical reports in the database, 315 reported a ground condition hazard, suggesting these hazards are prevalent in areas commonly developed in the Rotorua District.

9.3 Ground Condition Risks

9.3.1 Ground Conditions Risk – Potential Consequences and Land Use Influences

Challenges for geotechnical and civil engineering of soft and compressible soils include:

- Settlement: The most significant problem with compressible soils is their tendency to compact under load, leading to the settlement of buildings and roads, sometimes unevenly, which can cause damage or even failure of these structures.
- Low Shear Strength: Compressible soils often have low shear strength, meaning they can't resist deformation under applied shear stress. This property increases the risk of slope instability and landslides.
- Highly Permeable: Compressible soils like peat or loam can be highly permeable, meaning they allow water to pass quickly. If these soils are not adequately drained, this can lead to a rise in pore water pressure due to increased load, which further lowers the soil's shear strength and stability.

The immediate consequences of liquefaction are damage to land and structures on it. Liquefaction can also cause flow-on consequences for infrastructure and services, as well as economic and social consequences, such as the costs of repair, loss of productivity, community disruption and displacement, and mental health issues.

Building in areas susceptible to these ground condition hazards (exposure), and the design of buildings and infrastructure (vulnerability) are the primary ways in which land use can influence risk, providing opportunities for intervention.

9.3.2 Ground Conditions Risk Assessment under the Bay of Plenty Regional Policy Statement

Risk assessment for liquefaction under the BOPRPS at plan development stage (NH 8A) is to be undertaken by the regional council (Policy NH 13C). This has yet to occur. The risk assessment methodology does not apply to risks associated with soft soils.

9.3.3 Ground Conditions Risk Assessment under National Guidance

The national guidance for planning and engineering for potentially liquefaction-prone land was issued as guidance under section 175 of the Building Act to assist parties to comply with their obligations under the Building Act and was also intended to assist parties to comply with the RMA (MfE and MBIE, 2017).

The guidance details a liquefaction risk assessment process at varying levels of complexity and confidence for different development scenarios. The basis of the risk assessment is the probability and degree of liquefaction-induced ground damage for 500-year and 100-year shaking events. The assessment also builds on the level of liquefaction vulnerability identified for the land from previous assessments.

This plan change is not a development scenario to which the guidance applies. However, it is relevant to compare whether the District Plan, alongside other methods, provides for liquefaction assessment for developments consistent with the guidance.

9.3.4 Ground Conditions Risk Assessment under the NPS for Natural Hazards Consultation Material

The consultation material for the emerging NPS for Natural Hazards addresses liquefaction but does not cover soft, compressible soils.

Based on this material, and by comparing the 500-year return period shaking assessment under the national guidance with the 500-year column in the consultation material's risk matrix, the following observations can be made:

- Level A hazard susceptibility mapping does not directly identify areas where damage may be 'moderate' (and therefore also triggering at least 'medium' risk, which is also 'significant) risk'). Instead, it uses a more conservative approach by mapping areas where liquefaction is 'possible' – that is, where there is more than a 15% chance of minor to moderate liquefaction-inducted damage in a 500-year event.
- In other words, the area identified as 'liquefaction is possible' is likely to be bigger than the area where the risks are 'significant' when considered for a 500-year event.
- More detailed assessment (Level B or higher) provides a more accurate indication of liquefaction risk in line with the consultation material. However, even these assessments allow for conservatism in the category descriptions.

It is difficult to assess risk according to the consultation material methodology at a district scale and limited weight has been given to any conclusions.

9.3.5 Ground Conditions Risk - Comments and Conclusions

The following observations that support the need to manage the risks from ground condition hazards in the Rotorua District:

- As noted above, data gathered from previous geotechnical assessments indicates ground condition hazards are prevalent in the Rotorua District, at least in areas commonly developed.
- A substantial amount of existing urban areas, as well as future urban areas in the Future Development Strategy, are mapped as 'Liquefaction is possible' and/or Zone D under soft soil mapping.
- The Christchurch experience has highlighted that liquefaction damage, because it can be experienced extensively in one earthquake or sequence of earthquakes, can have widespread economic effects and social disruption.

9.4 Existing District Plan Provisions for Ground Condition Hazards

As noted above, the 2010 mapping of soft soils is included in District Plan maps (hardcopy map 209). In the hardcopy/static version, soft soil mapping over the Lakes A Zone is depicted with lighter

colours (higher transparency), which confuses its status. The online version, however, gives no distinction in the Lakes A Zone

There are no specific objectives or policies for liquefaction or soft soils, but land instability policy NH-P2 (applying only to rural areas) arguably addresses liquefaction and soft soil if considered a type of 'land instability':

> *Ensure buildings and activities do not increase land instability by requiring stabilisation measures where necessary.*

Currently, the District Plan's key role with respect to liquefaction and soft soils is at subdivision:

- In the main part of the District Plan (outside the Lakes A Zone), site suitability performance standard SUB-S8(3) requires that, as part of a subdivision application for "ground subject to slippage and subsidence", information be provided to establish whether the site is or is likely to be subject to slippage or subsidence and that it is suitable for intended future use and it will not worsen the effects of potential slippage or subsidence.
- Site serviceability standard SUB-S9 further requires that all sites have an area with a foundation suitable for the intended future use, free from erosion, subsidence and slippage. Bulk earthworks, slope stability or the suitability of natural and made ground for foundations roads etc. must also be evaluated, investigated and controlled by a chartered professional engineer specialising in geotech works.
- In the Lakes A Zone, the performance standards for building platforms (Rule 6) require that they are clear of any areas of instability.

Compliance with these performance standards is checked through submission of geotech reports at subdivision. Generally, these are detailed reports, assessing the suitability of identified building platforms, appropriate foundation design and other conditions. However, for subdivision of larger lots where there is less certainty about the location of future buildings, these reports may be more high-level, providing confidence that a feasible building platform exists but noting an expectation for further work at building stage.

To assist and provide clarity around implications for future development and further investigation expectations at building stage, RLC's practice is to prepare consent notices to condition the recommendations of the geotech reports but also allow for alternative reports and recommendations. Below is a typical consent notice:

> *The owners and subsequent owners of Lot x are advised of the following:*
>
> *That the geotechnical investigation undertaken by x as part of the subdivision process has identified that the soils on these lots do not meet the definition of 'good ground' as specified by NZS3604:2011. A specific engineered foundation design by a suitably qualified chartered professional engineer shall be required for any future residential unit in general accordance with the recommendations of the [Report, date x] or an additional geotechnical assessment prepared by a suitably qualified and experienced geoprofessional.*

9.5 Management of Ground Condition Hazards outside the District Plan

9.5.1 Regional Policy Statements and Regional Plans

The BOPRPS plays a key role in managing ground condition hazards in relation to growth areas. Policy NH-9B of the BOPRPS requires that risk from natural hazards be assessed for subdivision and intensification proposals for urban sites over 5 hectares if it has not already been assessed. Furthermore, the BOPRPS expects structure plans to be developed to support large-scale land use changes (Method 18). This provides processes for refining hazard mapping and mitigation options in areas where liquefaction susceptibility has been identified.

9.5.2 Building Act, Building Code and Associated Guidance

Building design for reducing the risks from ground condition hazards is primarily addressed through the Building Act, Building Code and associated guidance.

Clause B1 – Structural Stability is the key clause of the Building Code. The common method of compliance with the performance requirements is through the acceptable solutions that refer to various New Zealand standards. These key standards (NZS 3604:2011 for timber framed buildings and NZS 4229:2013 for masonry buildings), in turn, are limited to buildings on 'good ground'. Relevant parts of the definition of good ground that exclude ground subject to liquefaction are set out below:

> *any soil or rock capable of permanently withstanding an ultimate bearing pressure of 300 kPa (i.e. an allowable bearing pressure of 100 kPa using a factor of safety of 3.0) but excludes…c) Any ground which could foreseeably experience movement of 25 mm or greater for any reason including one or a combination of: …liquefaction, lateral spread….*

Where good ground is not met, alternative compliance pathways are required, usually involving special engineering design and verification methods with reference to New Zealand Standards. NZS 1170.0 is one such standard that is important for liquefaction design.

MBIE's Canterbury guidance is also key to the management of liquefaction risks to buildings (MBIE, 2010, last updated 2012). This guidance is 'official guidance' under section 175 of the Building Act and informs foundation designs throughout New Zealand. The objectives of the guidance are to comply with life safety requirements in ultimate limit state seismic events while also providing a level of habitability and potential repairability in that design event; and to minimise damage and repair costs in serviceability limit state events. The guidance accepts that some damage may result in either design event, but it attempts to balance the initial costs of improved robustness against the risk of future damage in a seismic event.

Various other non-statutory standards also assist building consent authorities, and the experts involved in preparing building consent applications to implement the requirements of the Building Code. For example, NZGS/MBIE Module 2 Guidance "Geotechnical Investigations for Earthquake Engineering" outlines a minimum scope of shallow geotechnical investigation for timber-framed residential buildings.

Due to the complicated geology in the Rotorua District, RLC's expectation is that geotechnical assessments accompany applications for new buildings and larger extensions. Most geotechnical assessments supporting development in the Rotorua District do not find good ground and therefore trigger special design guided by the standards and guidance discussed above.

9.5.3 Infrastructure standards

Engineering standards influence the resilience of infrastructure to ground condition hazards.

9.6 Regional Direction for District Plan Ground Condition Hazards Provisions

No specific regional plan or regional policy statement provisions (beyond those discussed for all hazards in section 3) have been identified to guide the development of the District Plan with respect to ground condition hazards.

9.7 Issues Identified with Ground Condition Provisions

No significant changes are considered necessary to the District Plan because it is considered that existing subdivision standards, alongside site-based investigation and design at building stage to meet the Building Act/Building Code, provide an appropriate response to meet the objectives for natural hazards. However, the following issues have been identified to guide refinement of the District Plan:

1. **Inconsistent Approach to Hazard Mapping in the District Plan**
   The inclusion of some hazard or susceptibility maps (soft soil, faults, landslide susceptibility and geothermal system boundaries, but not others (e.g. liquefaction, flood hazards) leads to potential confusion and inefficiencies. Retaining maps in the District Plan may also lead to reliance on information that is no longer up to date.
2. **Unclear policy framework**
   There is currently a lack of detailed policy to support practice and manage expectations regarding assessments of ground condition hazards at subdivision.
3. **Terminology in rules and standards is not aligned with practice**
   References to terms such as ‘freedom from slippage or subsidence’ and ‘foundations’ do not align with current risk-based approaches and may cause uncertainty and reduce efficiency in plan interpretation and implementation.
4. **Lack of alignment in Lakes A Zone**
   The approach in the Lakes A Zone is similar but not fully aligned with the broader Natural Hazards chapter. There is an opportunity to consider further alignment to improve consistency, clarity and efficiency.

9.8 Proposed Changes to Ground Condition Policies, Rules and Mapping

9.8.1 Remove Soft Soil Mapping from the District Plan

This plan change proposes to remove all hazard maps, including the soft soil maps, from the District Plan (except for geothermal system boundaries).

Removal of hazard mapping, as a general approach, is considered the most efficient and effective way to achieve the objectives, as it enables decision-making using the most up-to-date information. While

soft soil mapping is not considered likely to change, it should be removed as part of this general approach to avoid confusion. It is not, in any case, referred to in any method.

9.8.2 Clarify Ground Condition Hazards Policy and Performance Standards

The following changes are proposed. These changes are not expected to change consenting practice but are intended to clarify expectations for developers about how ground condition hazards (and slope stability hazards) are managed at subdivision and the expertise required, and align terminology throughout the plan, thereby improving efficiency and effectiveness.

a) Replace Policy NH-P2 in the Natural Hazards chapter to clarify existing practice that ground condition hazards are assessed at subdivision. This policy is also proposed to address slope stability hazards, as discussed below:

> ***Land Stability*** ~~***Land Instability Rural Zones***~~
>
> *NH-P2 Require an assessment of slope stability and ground condition hazards (including landslides, liquefaction and soft, compressible soils), associated risks and mitigation options, for sites proposed to be subdivided for development. The assessment shall be undertaken by a suitably qualified and experienced person and appropriate to the site's hazard susceptibility and risks.*
>
> ~~*NH-P2 Ensure buildings and activities do not increase land instability by requiring stabilisation measures where necessary.*~~

b) Amend subdivision performance standard SUB-S8(3):

> ***Land Stability*** ~~***Subdivision of land or buildings on ground subject to slippage and subsidence (including liquefaction)***~~
> *As part of a subdivision consent application information will be required to establish whether the site is or is likely to be subject to damage through slope stability and ground condition hazards (including landslides, liquefaction and soft, compressible soils)* ~~*slippage or subsidence*~~*. It shall be demonstrated that the site is suitable for subdivision and for the intended future use, and that it will not worsen the effects on other property of any land stability hazard* ~~*potential slippage or subsidence*~~*.*

c) Amend subdivision performance standard SUB-S9(1) because absolute 'freedom' from subsidence and slippage is not considered necessary to achieve low risk and meet the proposed objectives for natural hazards; and to refer to 'building platforms' rather than 'foundations', which have yet to be constructed at the time of assessment:

> *a. For the subdivision of any land or buildings the following shall apply in relation to earthworks,* ~~*foundations*~~ *building platforms and land stability:*
> *i. All sites within the subdivision shall have an area with a building platform* ~~*foundation*~~ *suitable for the intended future use* ~~*which will be free from erosion, subsidence and slippage*~~*;*
> *ii. All earthworks shall be carried out in a manner that does not disturb riparian margins, adversely affect Significant Natural Areas, indigenous vegetation or significant habitats or Significant Geothermal Features. Where the site is within a feature identified in the schedules for Historical and Cultural Values or Natural Environmental Values, or is a Significant Geothermal Feature, then the provisions of these chapters of the plan shall apply; iii. Modifications to the natural environment*

resulting from earthworks shall be minimised, avoided or mitigated in order to preserve existing landscape and habitat features;

iii. *Bulk earthworks, slope stability ~~or~~ and the suitability of natural and made ground for the foundations of buildings, road, services or other works, shall be evaluated, investigated, controlled and certified by a Chartered Professional Engineer specialising in Geotechnical works or an Engineering Geologist; and*

iv. *Where the volume of filling exceeds 50m^3 and the depth exceeds 450mm, the filling shall be tested and certified by a Chartered Professional Engineer*

9.8.3 Align Approach to Ground Condition Hazards in the Lakes A Zone

This plan change seeks to align the Lakes A Zone provisions as much as possible with the rest of the District Plan to improve clarity, efficiency, and equity. For ground condition hazards, it is proposed to extend new Policy NH-P1 to the Lakes A Zone as part of the broader extension of the Natural Hazards chapter to the Lakes A Zone.

As noted above, ground condition hazards are addressed in the Lakes A Zone through the building platform performance standard that requires they be located 'clear of any areas of instability or known natural or artificial hazard'. This performance standard applies both to land use activities and subdivision, through cross references in the subdivision rules. Where building platforms do not meet this performance standard, the activity is to be assessed as a discretionary activity. These standards and rules are proposed to be retained and are considered consistent with new Policy NH-P1.

The extension of Policy NH-P1 to the Lakes A Zone is not expected to change practice regarding when resource consents are required, how resource consents are assessed, and expertise required. However, it clarifies expectations for applicants to improve efficiency and effectiveness.

10. Ngā Matepā o te Ngoikoretanga o te Whenua – Slope Stability (Landslide) Hazards

10.1 Scope of Plan Change for Slope Stability and Summary of Proposed Changes

This plan change is intended to provide an opportunity for a full review of the District Plan provisions relating to slope stability hazards, except in relation to vegetation disturbance restrictions. This plan change also does not address slope stability hazards that occur in volcanic events.

In summary, the following changes are proposed and are explained in this section of the report:

- Removing the mapping of landslide susceptibility from the District Plan.
- Replacing Policy NH-P1 with a new policy to acknowledge assessment of ground condition hazards and slope stability at subdivision, and applying this policy to the whole district, including the Lakes A Zone.
- Reducing the permitted volume, cut face and fill depth thresholds in the performance standards for permitted earthworks in Industrial Zones, Business and Innovation Zones, and the Rural 1 Zone (EW-S1(1)).
- Reducing and clarifying the scope of the exceptions from the need to comply with earthworks performance standards for earthworks associated with subdivision and building platforms (EW-S1(4)).

10.2 Slope Stability Hazards affecting the Rotorua District

A landslide is a gravitational movement of rock, debris or soil down a slope. Landslides occur because the stress acting on a slope is greater than the strength of the slope. Events such as earthquakes and rainfall can trigger landslides by increasing slope stress or diminishing slope strength. Cycles such as wetting and drying, heating and cooling can also reduce the strength of a slope over time so landslides can occur with a relatively insignificant event or without an obvious trigger. For the banks of streams and rivers, trigger factors for instability also include high stream flows, that undercut the base of the banks.

Hazards are present in the area where the landslide is sourced, with the movement or loss of land, as well as in the 'runout' area inundated by the landslide (de Vilder et al, 2024). Land adjacent to the top of the area where the landslide is sourced may also be at risk through regression. Different types of landslides travel different distances. 'Debris flows' (large rapidly moving slurries) can occur, usually affecting land where confined watercourses in steep terrain meet flatter terrain allowing the debris to be deposited.

The Rotorua District does not appear as vulnerable as some other parts of New Zealand to frequent landslides. However there have been notable historic events triggering multiple landslides:

- In May 1999 rural roads north of Lake Rotorua were extensively damaged by landslides triggered by high rainfall (with some estimates suggesting a 1 in 200 year return period in places) (NIWA, NZ Historic Weather Events Catalogue).
- In 2004 a series of earthquakes triggered over 100 landslides around Lake Rotoehu and Lake Rotomā. Most of these failures are very small soil slides and falls of unconsolidated pyroclastics and tephra deposits around steeper parts of the lake shorelines, and on road cuts greater than 3 m high but extensive shallow soil slumps were also observed (G.T. Hancox et al, 2004).

Climate change is also affecting the frequency and intensity of landslides, with rainfall-induced landslides expected to increase due to more storm activity (de Vilder et al 2024).

In 2010 GNS produced landslide susceptibility mapping for the Rotorua District (Dellow, 2010b), which was adopted into the District Plan (hardcopy Map 211). The study is based on desktop information (geology and topography-slope angle) and provides relative susceptibility classes, from 'very low' to 'very high'. This study also explains the landslide record according to three general 'terrains' based on geology and slope:

- A Caldera terrain covering much of the Lakes A Zone, as well as other features, which has common landslide types of small rock-falls and hillside debris flows.
- The ignimbrite terrain, which covers extensive parts of the district, is dominated by low-relief surfaces dissected by narrow gorges of increased susceptibility.
- The Quaternary sediment terrain formed by river terraces and floodplains. Sites most susceptible are riverbanks.

In 2024 a similar landslide susceptibility study commissioned from WSP by BOPRC was published, which also covers the whole Rotorua District (WSP, 2024). A comparison of these studies found that, overall, the WSP study is more comprehensive and uses more up to date data (Tonkin & Taylor, 18 December 2024).

These existing studies focus on the source area for landslides and do not address the area affected by runout, slope setback or debris flows. BOPRC is currently working to develop case studies of landslide susceptibility mapping that also include runout and regression. They have identified the western side of the Rotorua caldera and slopes of Mount Ngongotahā as priorities for case studies, amongst other sites outside the Rotorua district.

We also understand that the Waikato Regional Council is pursuing landslide susceptibility mapping, which would likely cover the Waikato part of the Rotorua district.

Like other susceptibility maps, these studies are intended as a 'flag' to broadly identify where further site-specific consideration is needed. As they do not convey the probability of landslides occurring, they might not be termed true 'hazard' maps. WSP specifically excluded use of their study in a District Plan. Nonetheless, it is considered to provide information that may assist with geotechnical assessments provided to support consent applications, noting the limitations including with respect to scale, regression, runout and debris flows.

10.3 Slope Stability Risks

10.3.1 Slope Stability Risk – Potential Consequences and Land Use Influences

Potential consequences of landslides have been summarised in national landslide planning guidance (de Vilder et al 2024):

Land	• Permanent loss or degradation of valuable land. • Ground cracking and ***rock slope deformation***. • Removal of topsoil. • Formation of landslide dams with potential upstream inundation and downstream flood and breach hazard.
Environment	• Disrupted drainage. • Discharge of sediment/debris into waterways. • Impact on water quality and habitat. • Sediment deposition – potentially contaminated and creating fine airborne dust when dried. • Loss of soil carbon.
Buildings	• Undermining and collapse of buildings. • Inundation and damage to buildings. • Warping of buildings. • Damage to service connections
Infrastructure	• Damage due to undermining or inundation of access/parking, roads, bridges, stop banks, surface and underground services, facilities such as hospitals. • Debris-laden flood flows in waterways, resulting in damage to roads, bridges, stop banks, surface and underground services, buildings and facilities adjacent to waterways.
Economic	• Loss of productivity due to impact on commercial facilities and disruption to utilities and transport networks. • Loss of agriculture/horticultural productivity due to sediment deposition or erosion. • Cost of damage repair.
Social	• Death or injury. • Psychological health issues caused by stress and fear of further loss. • Isolation of communities due to infrastructure damage. • Community disruption and displacement with associated psychological health issues.

Land use changes and other human modifications can increase the susceptibility of a slope to landslides and can trigger failures. For example, earthworks (removal of support at the bottom of a slope, addition of material at the top of a slope) changes in drainage and water discharge, placing structures that add weight to sloping land and changing the vegetation cover. Placement of buildings and structures in susceptible areas also increases the risks (de Vilder et al 2024).

10.3.2 Slope Stability Risk Assessment under the Bay of Plenty Regional Policy Statement

As current slope stability hazard information is limited to 'susceptibility' type information, it is not considered possible to confidently provide an estimate of the level of risk at the 'hazard zone' scale across the Rotorua District using the matrix in the BOPRPS. Nor is considered possible to provide an estimate of the potential average annual individual probability of fatality at this scale (in accordance with the secondary analysis methodology).

Risk is very site specific, and it is considered more useful to assess at the development scale.

10.3.3 Slope Stability Risk Assessment under National Guidance

The New Zealand Geological Society's 'Slope Stability Geotechnical Guidance Series' serves as a best-practice guideline in relation to slope stability at the scale of a specific 'slope' and is intended to support geo-professional assessments and consenting decisions (NZGS, 2024). The guidelines provide a framework for assessing the level of information that should be gathered and required expertise to support decision-making that builds on and adapts existing literature.

GNS also published national guidance for reducing landslide risk through land use planning in 2024 (de Vilder et al, 2024). The guidance includes detailed information on acceptable/tolerable individual and societal risk thresholds from literature. It then encourages planning rules based on the level of risk, with landslide susceptibility mapping described as a 'bare minimum' to rule out areas that do not require further consideration.

10.3.4 Slope Stability Risk Assessment under the NPS for Natural Hazards Consultation Material

Current district and regional-wide assessments of susceptibility to landslides are not considered sufficient to enable assessment of risk levels for land using the approach in the consultation material. This is better considered at a development scale.

10.3.5 Slope Stability Risk - Comments and Conclusions

The impacts of landslides in the Rotorua District have not been as significant as experienced in some other districts in New Zealand. Nonetheless, slope stability has been an issue for some sites. Claims to the Natural Hazards Commission (formerly EQC) suggest that landslides have been an ongoing issue for property. For example, from June 1997 to May 2025 there were 12 settled claims at Lake Tarawera, ten at Lake Ōkāreka, six at Kawaha Point and four at Lake Rotomā (www.naturalhazardsportal.govt.nz). Furthermore, of the 348 geotechnical assessments submitted over recent years, almost ten percent (30) had a slope stability issue.

While no recorded fatalities from landslides are known in the Rotorua District (aside from those associated with the 1886 Tarawera eruption), slope stability hazards can cause fatalities. Several events triggering multiple landslides have happened in the recent past and can be expected to happen again with a reasonably high frequency.

Landslide risk is also expected to increase with climate change.

Overall, the risks from slope stability are considered sufficient to justify continued consideration at a and potentially mitigation.

10.4 Existing District Plan Provisions for Slope Stability

The key way that landslide risk is managed in the main part of the District Plan is through consideration at subdivision, as provided for under the following provisions:

- Performance standard SUB-S8 requires that, as part of a subdivision application for "ground subject to slippage and subsidence", information be provided to establish whether the site is or is likely to be subject to through slippage or subsidence and that it is suitable for intended future use and it will not worsen the effects of potential slippage or subsidence.
- Performance standard SUB-S9 requires that all sites have an area with a foundation suitable for the intended future use, free from erosion, subsidence and slippage; and that bulk earthworks, slope stability of the suitability of natural and made ground for foundations roads etc. shall be evaluated, investigated and controlled by a chartered professional engineer specialising in geotech works.
- General matters of control at subdivision in SUB-MC1 provide control over the extent to which vegetation is retained or enhanced.

The susceptibility hazard mapping provides an indication to applicants and RLC of where landslide hazards should be considered, but consulting geo-professionals may also rely on additional site-specific information.

Earthwork performance standards (Rule EW-R1 and Performance Standard EW-S1) are also relevant as these provide thresholds to target consideration of the effects of earthworks in terms of land stability and other issues. Performance standards include maximum volume, maximum depth of fill, maximum height of cut face and retaining structures. The earthwork performance standards also require that earthworks are not within 25m of the margin of a lake, wetland, stream or river. When these thresholds are breached, all relevant objectives and policies of the plan, including those relating to natural hazards, can be considered as well as a matter of discretion relating to specifically to natural hazards. Specific activities, such as gardening and maintenance of tracks, are exempt from the need to comply with these standards.

Restrictions on vegetation disturbance are also relevant to slope stability issues but are not, in the Rotorua District Plan, developed for slope stability reasons and are outside the scope of this plan change.

It is also noted that, in addition to the strategic objectives and policies in SDNH, Policy NH-P2 addresses slope stability (under the term 'land instability') specifically in Rural Zones, stating:

> ***Land instability in Rural Zones***
>
> *NH-P2 Ensure buildings and activities do not increase land instability by requiring stabilisation measures where necessary.*

However, this policy is not reflected well in the methods, with District Plan methods limited to earthworks, as described above. The risks relating to building are, instead, managed through the Building Act, as outlined below.

In the Lakes A Zone, slope stability is addressed at both subdivision and building. Rule 6 includes a permitted activity performance standard to require building platforms to be located clear of any areas of instability. This performance standard is also linked to subdivision rules. In some management areas in the Lakes A Zone, a further performance standard applies so that building platforms on slopes that exceed 24 degrees require consent.

The Lakes A Zone also has its own rules and performance standards for earthworks as a permitted activity (Rule 5). Notably, in addition to volume fill depth and height of cut face, there are also standards relating to slope angle. The standards also require location outside of ephemeral watercourses.

There are also extensive vegetation disturbance rules for the Lakes A Zone (Rule 4), which have relevance to slope stability, but are not within the scope of this plan change.

10.5 Management of Slope Stability Outside the District Plan

10.5.1 Regional Policy Statements and Plans

The Bay of Plenty Natural Resources Plan addresses maintenance of the region's soil resource, which also has relevance for landslide management. This sets permitted earthwork limits across the whole region, depending on the environment in which the activity occurs and slope, with respect to exposed area and volume.

The Waikato Regional Plan has rules for the purpose of mitigation of accelerated erosion in 'High Risk Erosion Areas', which are defined to include land where the pre-existing slope exceeds 25 degrees. These rules require resource consent for soil disturbance activities exceeding standards for volume or area or height of cut slope batters. In High Risk Erosion Areas the rules also require resource consent for vegetation clearance over one hectare with specific exclusions.

10.5.2 Building Act and Building Code

There are two key aspects to the building regime: (1) the hazard provisions (section 71 to 74) and (2) the requirements of clause B1 of the Building Code with respect to structural stability.

Sections 71 to 74 of the Building Act address whether a building consent authority can grant consent for buildings on land subject to natural hazards and, if so, whether they must require a notice about the hazard on the land title. While the definition of natural hazard for the purpose of these sections does not use the terms slope stability or landslide, the hazard is covered under 'falling debris' and 'slippage'. The potential for building consent refusal or hazard notices under these provisions is a key incentive to site buildings and their associated earthworks and drainage to reduce landslide risk. Otherwise, works are needed to mitigate the risks.

Clause B1 of the Building Code contains the objectives and requirements for structural stability. As discussed for other hazards, acceptable solutions are key to establishing compliance. However, designers must use alternative compliance methods, usually involving special engineering design and approved verification methods, where the criteria for application of acceptable solutions are not met. Relevant to landslide, the definition of 'good ground' is one such limit to the application of acceptable solutions, which excludes:

> *Any ground which could foreseeably experience movement of 25 mm or greater for any reason including one or a combination of: land instability, ground creep, subsidence, liquefaction, lateral spread, seasonal swelling and shrinking, frost heave, changing ground water level, erosion, dissolution of soil in water, and effects of tree roots.*

The Acceptable Solution B1/AS1 (which references NZS 3604:2011) also has specific limitations on building on or near sloping ground. NZS 3604:2011 applies to buildings on good ground with slopes no steeper than 1 in 4 (25%). Where slopes exceed this or other limitations apply (e.g. proximity to slope crests or toes), NZS 3604 does not apply, and a specific structural or geotechnical design is required. The Geotechnical Verification Method B1/VM4 provides a framework for assessing land

stability, including the effects of sloping ground, and requires confirmation that overall slope stability has been assessed and is adequate for the proposed development.

Given the complexity of geological conditions in the district, geotechnical reports are expected to accompany most building consent applications for new buildings and building extensions over 50% of the original floor area. This assists to ensure that landslide hazards, as well as other geological hazards, are appropriately considered and the requirements of the Building Act and Building Code are met. Landslide susceptibility mapping provides an indication for applicants and RLC of where landslide hazards should be considered, but technical advisors may also rely on additional site-specific information.

10.5.3 Section 106 RMA

As noted in relation to other hazards, section 106 of the RMA enables a consent authority to refuse subdivision consent or impose conditions if it considers there is a significant risk of natural hazards; and a similar provision is being considered for land use consents under the recent RMA Amendment Bill. However, significant risk has not been defined in the RMA.

10.5.4 Common Law

Common law principles of servitude, nuisance and negligence also have relevance to landslide issues.

10.6 Regional Direction for District Plan Slope Stability Provisions

No specific regional plan or regional policy statement provisions (in addition to that discussed for all hazards in section 3) have been identified to guide the development of the District Plan with respect to slope stability hazards.

10.7 Issues identified with Slope Stability Provisions

The following issues have been identified with the slope stability provisions, based on technical advice, consultation and evaluation of the existing provisions and have informed the changes proposed are:

1. **Outdated and redundant mapping in the District Plan**
   Landslide susceptibility maps currently included in the District Plan do not reflect the most up-to-date technical information and are not referenced in any policy or method.
2. **Lack of clarity at the policy level**
   The District Plan lacks detailed policy direction for managing slope stability hazards. The current slope stability policy for the Rural Zone (NH-P2) is not well-aligned with associated methods.
3. **Inconsistent and Insufficient earthworks standards**
   Permitted activity thresholds for earthworks in some zones (particularly Industrial, Business and Innovation, and Rural 1 Zones) are set too high to adequately manage risks to slope stability. Current thresholds may allow landform modifications that exacerbate slope instability without triggering resource consent.
4. **Broad and unclear exemptions from earthworks standards**
   Existing exemptions from earthwork performance standards—such as for activities incidental to subdivisions or building platforms—are ambiguous and may enable significant earthworks without appropriate scrutiny. This reduces the effectiveness of the provisions in managing slope stability hazards.

5. **Inconsistencies between the Lakes A Zone and the rest of the District Plan**
   The approach to slope stability hazards in the Lakes A Zone differs from that applied elsewhere in the district. This inconsistency reduces clarity for plan users and may result in inequitable outcomes or inefficiencies in implementation.

It is also acknowledged that GNS planning guidance supports greater use of the District Plan to identify slope stability hazard areas and regulate activities within them, including at land use stage. Reasons include that, while the Building Act and the related Building Code can address slope stability risks for key activities – for buildings and for associated earthworks and drainage – these tools apply late in the development process, when development expectations are already established, and design costs have been committed. However, an approach to identifying a high-hazard areas for slope stability has not been identified. As noted above, WSP specifically excluded use of their landslide susceptibility study in a District Plan.

10.8 Proposed Changes to Slope Stability Policies, Rules and Mapping

10.8.1 Remove Landslide Susceptibility Mapping from the District Plan

It is proposed to remove all hazard maps (including landslide susceptibility mapping) from the District Plan, except for geothermal system boundaries. The removal of the maps from the District Plan is considered more efficient and effective as a general approach, as it enables decision-making using the most up-to-date information, including the more comprehensive WSP study for landslide susceptibility and emerging studies.

The existing landslide susceptibility maps are not, in any case, directly referred to in any policy or method in the District Plan.

10.8.2 Clarify Slope Stability Policy and Performance Standards

The existing Policy NH-P2 for Rural Zones is not considered appropriate as stabilisation methods may always be an appropriate response to slope stability hazards, and it is not well connected to methods in any case.

As discussed for ground condition hazards, it is proposed to replace Policy NH-P2 (relating only to Rural Zones) with a land instability policy covering consideration of ground condition and slope stability hazards at subdivision. The new policy is not expected to change practice but clarify expectations that slope stability hazards are managed at subdivision, and align terminology throughout the plan, thereby improving efficiency and effectiveness.

> ***Land Stability Hazards ~~Land Instability Rural Zones~~***
>
> *NH-P2 Require an assessment of slope stability and ground condition hazards (including landslides, liquefaction and soft, compressible soils), associated risks and mitigation options, for sites proposed to be subdivided for development. The assessment shall be undertaken by a suitably qualified and experienced person and appropriate to the site's hazard susceptibility and risks.*
>
> *~~NH-P2 Ensure buildings and activities do not increase land instability by requiring stabilisation measures where necessary.~~*

As discussed for ground condition hazards, it is also proposed to amend the subdivision performance standards SUB-S8(3) and SUB- S9(1) as follows to align terminology throughout the District Plan and clarify that absolute freedom from erosion, subsidence and slippage is not required:

3. Land Stability ~~Subdivision of land or buildings on ground subject to slippage and subsidence (including liquefaction)~~

As part of a subdivision consent application information will be required to establish whether the site is or is likely to be subject to damage through slope stability and ground condition hazards (including landslides, liquefaction and soft, compressible soils) ~~slippage or subsidence~~. It shall be demonstrated that the site is suitable for subdivision and for the intended future use, and that it will not worsen the effects on other property of any land stability hazard ~~potential slippage or subsidence~~.

6. Site development and earthworks

a. For the subdivision of any land or buildings the following shall apply in relation to earthworks, ~~foundations~~ building platforms and land stability:

i. All sites within the subdivision shall have an area with a building platform ~~foundation~~ suitable for the intended future use ~~which will be free from erosion, subsidence and slippage~~;

ii. All earthworks shall be carried out in a manner that does not disturb riparian margins, adversely affect Significant Natural Areas, indigenous vegetation or significant habitats or Significant Geothermal Features. Where the site is within a feature identified in the schedules for Historical and Cultural Values or Natural Environmental Values, or is a Significant Geothermal Feature, then the provisions of these chapters of the plan shall apply; iii. Modifications to the natural environment resulting from earthworks shall be minimised, avoided or mitigated in order to preserve existing landscape and habitat features;

iii. Bulk earthworks, slope stability ~~or~~ and the suitability of natural and made ground for the foundations of buildings, road, services or other works, shall be evaluated, investigated, controlled and certified by a Chartered Professional Engineer specialising in Geotechnical works or an Engineering Geologist; and

iv. Where the volume of filling exceeds 50m3 and the depth exceeds 450mm, the filling shall be tested and certified by a Chartered Professional Engineer

10.8.3 Amend General Earthwork Performance Standards

The existing performance standards for volume, fill depth and height of any cut face in Industrial Zones, Business and Innovation Zones and the Rural 1 Zone are not considered sufficient to ensure manage associated slope stability risks. It is proposed to align the standards across all zones but retain the higher volume for the Rural 1 Zone. It is noted that significant exemptions from the need to meet these performance standards would still apply, such as access to a permitted activity (for example farm tracks), land preparation for fencing, normal gardening and earthworks accessory to the use and occupation of a residential unit (refer to EW-S1(4) for further exemptions).

EW-S1 General earthworks performance standards

a. ~~Industrial Zones, Business and Innovation Zones and Rural 1 Zone:~~

~~i. The volume shall not exceed 1000m³ in any 12 month period;~~

~~ii. Any fill shall be cleanfill and shall not exceed 5m in depth; and~~

~~iii. The cut face of any excavation shall not exceed a vertical dimension of 3m.~~

b. ***~~In all other zones other than those listed in 1 above~~:***

~~i.~~a. The volume shall not exceed the following ~~100m³~~ in any 12 month period:

i. Rural 1 Zone: 1000m³

ii Other Zones: 100m³.

~~ii.~~b. Any fill shall be clean fill and shall not exceed 450mm in depth; ~~and~~

~~iii.~~c. The cut face of any excavation shall not exceed a vertical dimension of 1.5m.

~~All Zones:~~

~~a.~~d. It shall not require retaining structures that are either in excess of 1.5m in height (measured from the finished ground level) at any point or in excess of 20m in total length;

~~b.~~e It shall not result in the modification of a Mamaku Tor; and

~~c.~~f It shall not be carried out within 20m of the Waikato River Operating Easement boundary (as identified on map 213 and the Planning Maps).

[Refer also to 6.9.3 of this report for an additional proposed performance standard regarding overland flowpaths.]

The following table provides an assessment of these changes against the existing provisions.

	Option 1: Retain the existing provisions. • Earthworks in Industrial Zones, Business and Innovation Zones and the Rural 1 Zone will be subject to existing performance standards for permitted activities relating to fill depth (5m) and cut face height (3m). • Earthworks in Industrial Zones and Business and Innovation Zones are subject to existing permitted activity performance standards for volume (1,000m^3 in any 12 months). • Various activities are exempt from the need to meet performance standards.	Option 2: Reduce the permitted activity performance standards for earthworks in Industrial Zones, Business and Innovation Zones and the Rural 1 Zone to: • 1.5m cut face height. • 100 m^3 volume in any 12 months for Industrial Zones and Business and Innovation Zones (Rural 1 Zone standard remains 1,000m^3) Exceptions for various activities from the need to meet performance standards remain.
Relevant Objectives (as proposed to be amended)	*SDNH-O1: The risks from natural hazards to people, property and the environment associated with land use, subdivision and development are acceptable* *SDNH-O2: Land use, subdivision and development is resilient to the current and future effects of climate change*	
Efficiency and Effectiveness of Achieving Objectives	The existing standards permit large-scale earthworks without resource consent. These can result in significant modification of landforms and may increase the likelihood of slope failure and surface instability.	Lower thresholds for permitted earthworks reduce the potential for adverse effects associated with land disturbance, such as instability, over-steepened slopes, and uncontrolled runoff. Requiring resource consent for larger-scale earthworks allows for site-specific assessment and conditions to manage instability risk. The approach is more precautionary and improves the ability to avoid or mitigate hazard-prone land use.
Costs and Benefits	The amended standards create greater consistency across all zones, including the Lakes A Zone.	More developments may trigger resource consent requirements, resulting in higher costs and longer timeframes for some landowners and developers.
Risks of acting or not acting if insufficient information	A broad review of the exceptions from the need to comply with performance standards may also be needed. However, as earthwork rules relate to multiple objectives, it is considered that this plan change is not the appropriate process to progress this review. Research and consultation to develop the proposals in this plan change has focused on natural hazard issues.	
Conclusion	Option 1 is considered less appropriate.	Option 2 is considered more appropriate.

10.8.4 Amend Activities Exempt from General Earthwork Performance Standards

The exemption from the permitted activity performance standards for earthworks incidental to an approved subdivision is considered ambiguous and potentially too broad. In any case, practice is to assess earthworks as a land use activity (with consent needed if necessary) rather than as part of a subdivision.

The exemption from the permitted activity performance standards for earthworks incidental to construction of a building platform is also considered to leave open the possibility of significant earthworks without scrutiny and consideration of the risks for natural hazards and other issues. It is considered that a narrower exception for earthworks for a building platform for which a building consent has been issued is more appropriate.

The following change to EW-S1(3)(a)(i) is proposed:

3. Exceptions

a. Notwithstanding the preceding requirements, the following activities are exempt from the performance standards above, provided that the activity meets EW-S1(g).

i. Earthworks ~~incidental to either an approved subdivision, or~~ for the construction of a building platform for a building for which building consent has been issued, or installation of utility services or to provide access to an activity which is a permitted activity or authorised by a resource consent.

10.8.5 Align Approach to Slope Stability Hazards in the Lakes A Zone

As explained for ground condition hazards, it is proposed to extend new policy NH-P1, which addresses for slope stability and ground condition hazards at the time of subdivision, to the Lakes A Zone as part of the broader extension of the Natural Hazards chapter to the Lakes A Zone. This extension of Policy NH-P1 to the Lakes A Zone is not expected to change practice regarding when resource consents are required, how resource consents are assessed, and the expertise required. However, it clarifies expectations for applicants to improve efficiency and effectiveness. Improved consistency across the different parts of the Rotorua District is also considered to have the benefit of promoting clarity.

It is not proposed to amend the building platform rules, which are also linked to subdivision activity status. This is considered consistent with proposed new policy NH-P1, and expert assessment would be expected where the performance standards are not met.

11. Ngā Matepā o ngā Ngāwhā - Geothermal Hazards

11.1 Scope of Plan Change for Geothermal Hazards and Summary of Proposed Changes

This plan change is intended to provide an opportunity for a full review of the geothermal hazard provisions in the District Plan.

Geothermal hazard provisions were only recently revised under Plan Change 9. This included the introduction of a requirement that, for most buildings in the Rotorua Geothermal System, reports are submitted at the time of building consent applications to identify geothermal hazards and their mitigation (NH-R8). RLC still supports this rule and proposes to extend it to other geothermal systems of the district, including those in the Lakes A Zone.

This plan change also proposes to amend Rule SUB-R42, which requires consideration of geothermal hazards at subdivision, using the overlay to clarify where Rule SUB-R42 applies.

It is also proposed to broaden Policy NH-P3, which addresses co-existence between Māori settlement and geothermal activity, to recognise that Māori connections to geothermal areas extend beyond

Ōhinemutu and Whakarewarewa to other geothermal areas across the district. It also adds a more practical approach by requiring cultural significance to be considered when assessing geothermal hazard risks, improving clarity and alignment with natural hazard objectives.

Further detail on the proposed changes, as well as background information and an evaluation of the changes, is provided in the following sections of the report.

11.2 Geothermal Hazards affecting the Rotorua District

Geothermal activity in the Rotorua District is associated with a number of geothermal hazards:

- **Geothermal Surface Features** (mudpools, geysers, steam vents, etc.) contain hot fluids and can eject material, sometimes unpredictably, with periods of increased and reduced activity.
- **Heated ground**, which can vary from a few degrees above ambient to boiling temperatures at shallow depths.
- **Geothermal gases and fluids** emitted from point sources or diffusely through the ground can contain noxious chemicals such as H_2S and CO_2. The gases can also be corrosive.
- **Ground instability** due to chemical and physical processes in geothermal systems that weaken soil and rock, decrease the ability to support loads and potentially cause ground collapse.
- **Hydrothermal eruptions** in geothermal areas can range significantly in size, ejecting material distances of only several metres to several kilometres. They are most likely to occur in areas where there are already high levels of geothermal activity (surface features)

While perhaps not a 'natural' hazard, bores and geothermal infrastructure also present a potential hazard because their deterioration or failure can give rise to hazards such as the emergence of hot ground, gas emissions and surface features.

Geothermal hazard mapping relating to the Rotorua District includes:

- **Geothermal System Extents**

  Mapping of the extent of geothermal systems is used to assist identify the potential locations of geothermal hazards but is based on geothermal aquifers and does not directly map geothermal hazards. There are also various versions of this mapping, including that in the District Plan.

- **Geothermal Surface Features**
  BOPRC maintains an inventory of geothermal surface features, which is available through their online mapping tool. Maps of 'significant' geothermal features are included in the Waikato Regional Plan. Otherwise, geothermal vegetation mapping provides a proxy for identifying potential locations.

- **Heated Ground and Gas**
  There have also been various studies of heated ground and geothermal gas hazards in the Rotorua Geothermal System. However, limited data extent and density limits their potential for use as hazard mapping (Scott, 2023).

- **Bores**
  Data on the location of geothermal bores is available from the RLC, BOPRC and the Wells Aotearoa database, but inaccuracies and inconsistencies exist among the datasets.

11.3 Geothermal Risks

11.3.1 Geothermal Risks – Potential Consequences and Land Use Influences

The table below summarises potential consequences of the various geothermal hazards, as well as land use activities that influence risk and, therefore, are a potential focus for management. This summary is based on earlier summaries by Tonkin & Taylor and GNS (Tonkin & Taylor Ltd, 2022; B Scott, 2010):

Hazard	Potential consequences	Land use activities that impact risk
Geothermal Surface Features	These features can cause injury to people or damage to structures.	Exposure is increased by constructing structures near features. Interference with a surface feature can potentially increase the hazard. For example, stormwater from development can interfere with these features.
Heated ground	Potential consequences include uncomfortable living environments, leading to loss of sleep and health issues; as well as material durability issues for structures.	Building in areas subject to heated ground increases exposure. The risks can increase with an increase in impervious surfaces, which can reduce the cooling effect of rainwater percolation and create a barrier to reducing heat radiation to the air.
Geothermal gases and fluids	Exposure to geothermal gases in sufficient concentrations can have acute health consequences, including death. Long term impacts from chronic exposure are less clear. The gases and fluids also cause material durability issues for structures.	Building in areas subject to geothermal gases and fluids increases exposure. The risks can increase with an increase in impervious site coverage, causing gas emissions to concentrate into gaps such as spaces between buildings or the entrances into buildings for services.
Ground instability	Potential consequences include building damage or failure and injury.	Building in areas affected by geothermal activity increases exposure. Some building designs are more vulnerable to damage/failure. Instability can be accelerated by concentration of stormwater from development.

Hazard	Potential consequences	Land use activities that impact risk
Bores and geothermal infrastructure	Damage to structures and injury.	Development can also block access to the bores/infrastructure for machinery, which is important in containing issues when they arise.
Hydrothermal eruptions	Damage to property, structures and injury.	Building close to existing areas with high levels of activity increases exposure.

11.3.2 Geothermal Risks - Comments and Conclusions

Geothermal hazards are not subject to the risk assessment methodology of the BOPRPS. Geothermal hazards are also not within the scope of the consultation material on the NPS for Natural Hazards. However, the level of risk remains a key consideration in determining whether land use and subdivision should be managed through the District Plan. Below are RLC's conclusions about the level of risk and implications for management:

1. Arguably the greatest geothermal risk (or more accurately, issue) facing the Rotorua District is enhanced corrosion and durability issues for structures, given that this is a known and widespread issue. However, this is considered primarily a matter for regulation under the Building Code, as discussed below.
2. In Rotorua city, fourteen deaths have been attributed to H_2S gas since 1946. The likelihood of death could, therefore, be described as 'very rare' across the whole city (estimated annual probability somewhere between 1×10^{-5} and 1×10^{-6}). Risk levels will vary at the site-specific scale depending on land conditions and site use; however, there is insufficient information to quantify these.
3. Comprehensive statistics on injuries from geothermal surface features are unavailable, but the risk is likely to be sufficient to warrant management for visitors to areas of high geothermal activity. However, this is considered best addressed through mechanisms other than the District Plan.
4. Hydrothermal eruptions have occurred historically and are expected to have a reasonable probability of reoccurrence, particularly for small eruptions in areas where surface heat flow is very high. These locations are generally less likely to face development pressures, reducing the potential risk.
5. Cumulative risk is also relevant when assessing geothermal risk, as areas susceptible to different geothermal hazards tend to overlap.
6. Traditional Māori settlements, including Ōhinemutu and Whakarewarewa, are notable for their proximity to areas of high geothermal activity.

11.4 Existing District Plan Provisions for Geothermal Hazards

11.4.1 Outside the Lakes A Zone

The existing rules relevant to managing the risks of geothermal hazards in areas outside the Lakes A Zone are summarised as follows:

1. **All geothermal systems outside the Lakes A Zone**

a) Requirements to assess geothermal hazards and mitigation at subdivision

Subdivision of buildings or land within the Rotorua Geothermal Systems Overlay, or affected by a geothermal feature, geothermal activity or bore is a discretionary activity (Rule SUB-R42).

Subdivision performance standard (SUB-S8(2)) requires applications for subdivision of land in the Rotorua Geothermal System or affected by geothermal activity, geothermal features or bores to identify the geothermal bores and features and include an assessment of risks and proposed measures to avoid, remedy or mitigate them.

Another subdivision performance standard (SUB-S9) requires that subdivision provides an area with a foundation suitable for intended future use free from subsidence. Technical advice from a qualified geo-professional is expected to ensure this standard is met.

b) Building Setbacks

Buildings located within 5 metres of a geothermal surface feature or bore require resource consent as a restricted discretionary activity. In assessing these applications, RLC retains discretion over ensuring that 'adverse effects from natural hazards or the worsening of any hazard identified on the planning maps are managed' (Rule NH-R6).

c) Impervious surface limits

The District Plan limits the percentage of a site that can be covered by impervious surfaces as a permitted activity in many zones. For example, RESZ-S3 in Residential Zones limits impervious surfaces for permitted activities to 70% in Residential 1 Zone and 80% in Residential 2 Zone. Where these limits are exceeded and resource consent is required (e.g. RESZ-R3(2)), RLC has discretion to consider natural hazards, including geothermal hazards.

2. Rotorua Geothermal System:

For the Rotorua Geothermal System only, Plan Change 9 introduced an additional requirement for most types of buildings to submit an assessment of geothermal hazards and mitigation at the same time as a building consent application (Rule NH-R8).

This rule was introduced to fill gaps not fully addressed under the Building Code, such as site design and managing potential effects on neighbouring land. Play Change 9 aimed to align with existing building consent processes, while encouraging more comprehensive consideration of geothermal hazards. Recent RLC guidelines support the preparation of these assessments (Rotorua Lakes Council, 2024, see below).

The rule was applied only to the Rotorua Geothermal System due to the limited scope of the plan change.

Policy NH-P4 (inserted by Plan Change 9) sets out the risk management approach reflected in the rules above:

Manage the risks to people and property from geothermal hazards, including by:

1. Requiring building setbacks from geothermal surface features and bores;

2. *Requiring site-specific geothermal assessments to be submitted for subdivision detailing the effects of the geothermal activity on the subdivision and subsequent use of the land or buildings, the effects on surface geothermal surface features, risks and proposed mitigation measures to ensure the suitability of the land for subdivision and the intended use;*
3. *Requiring site-specific geothermal assessments to be submitted at the time of application for building consent to identify the hazards and how risks are being mitigated; and*
4. *Assessing the impact on geothermal hazards and risk when zone standards for impervious surfaces are exceeded within geothermal systems.*

Policy NH-P3 addresses geothermal hazards in the context of co-existence with Māori villages:

> *NH-P3: Enable the continued co-existence of residential activities in the Te Arawa villages of Ōhinemutu and Whakarewarewa with the geothermal features throughout each village, whilst ensuring future development is undertaken with an acknowledgement of risks.*

In relation to subdivision, Policy SUB-P7 is relevant:

> *Restrict development subject to specific natural hazards, including*
> *…*
> *3.geothermal activity*
> *…*
> *such that the site would be unusable or unsafe or that the natural hazard risk exceeds acceptable levels.*

11.4.2 Lakes A Zone

In the Lakes A Zone, Objective OB 18 and Policy 13.1 (which are proposed to be limited to volcanic hazards, erosion and sedimentation) refers to geothermal activity:

> *Limited risks to human occupation and activity caused by the risks posed by natural hazards including…c)Geothermal activity…*
>
> *Policy 13.1: To recognise that hazards arise from volcanic activity, seismic activity, geothermal activity, flooding, fire, erosion and sedimentation and apply measures that reduce risk to people and property.*

The Lakes A Zone also has a policy directed specifically at geothermal hazards (Policy 13.2):

> *Policy 13.2 To avoid use and development over and by geothermal hazards.*

Currently, the Lakes A Zone does include specific provisions to implement Policy 13.2. However, the building platform performance standard in Rule 6.0, which requires location clear of any areas of instability or known natural or artificial hazard, may be relevant.

Subdivision in certain management areas also allows for natural hazard considerations (Rule 3:

- In the Bush Settlement Management Area and Protection Management Area, subdivision is a discretionary activity.
- In the Sensitive Rural Management Area, restricted discretionary subdivision reserves discretion over natural hazards.
- In the Settlement Management Area, discretion is not reserved over natural hazards where the building platform standard is met, but this is not an area known to contain geothermal hazards.

- In the Less Sensitive Rural Management Area discretion is not reserved over natural hazards, though some parts of this area lie within identified geothermal systems.

11.5 Management of Geothermal Hazards outside the District Plan

11.5.1 Regional Plans

The Rotorua Geothermal System is managed under its own regional plan - the Rotorua Geothermal Regional Plan. It includes a rule requiring resource consent as a discretionary activity for various activities that disturb geothermal features, as such activities may increase the risks of natural hazards as well as adversely affect the environment (13.5.3(b)(i)).

Other geothermal systems in the Rotorua District are covered by the Bay of Plenty Natural Resources Plan and Waikato Regional Plan, which primarily focus on the protection and use of the systems rather than geothermal hazards.

It is also understood that BOPRC intends to amend the provisions for the Rotorua Geothermal System and bring these inside the Bay of Plenty Natural Resource Plan, and that the focus of will be system protection and use, rather than natural hazard management.

Under the Waikato Regional Plan, most vegetation clearance and soil disturbance activities within 20 metres of a Significant Geothermal Feature are classified as discretionary activities requiring resource consent (Rule 7.6.6.3). While this rule is not linked directly to a natural hazard policy, it helps to encourage setbacks from surface geothermal features, thereby indirectly reducing hazard risks.

11.5.2 Building Act and Building Code

Building Code clauses B1 (Structural Stability), B2 (Durability) and F1 (Hazardous Agents) are relevant to managing geothermal hazards.

In support of Plan Change 9, it was acknowledged that the Building Code provides much of the “heavy lifting”. However, several gaps were identified in relation to the management of site layout (e.g. avoiding confined outdoor spaces), surface treatments, avoiding confined outdoor spaces and exacerbation of effects on neighbours (Morgan et al, 2023).

To address these gaps, Rule NH-R8 was introduced through Plan Change 9. It requires, as a performance standard for permitted activities, an assessment of hazards and mitigation methods to be submitted alongside most building consent applications within the Rotorua Geothermal System.

11.5.3 Rotorua Geothermal Bylaw

The Rotorua District Council Geothermal Bylaw includes several provisions relevant to land use planning:

1. A requirement to maintain site access to any well (bore) for a drilling rig (clause 5.12).
2. A restriction on constructing buildings or structures within 5 metres of an existing or closed well, except with the written approval of the Council, and subject to any conditions it may impose (clause 5.18).
3. A requirement for developers, owners or occupiers of every building to take all reasonably practical steps to incorporate acceptable barriers to hydrogen sulphide ingress or egress in new or upgraded buildings (clause 7.3).

11.5.4 Guidelines for Identifying and Designing for Geothermal Hazards

RLC recently published guidelines to help users understand how the Building Code and other requirements apply to geothermal hazards (RLC, 2024). These guidelines also help educate users about geothermal hazards and best practice for their management.

The guidelines are also intended to support the preparation of geothermal assessments under Rule NH-R8. The guidelines clarify the level of expertise required, which varies depending on the geothermal hazard profile for the site. For example, low-risk sites may require minimal assessment, while higher-risk sites require input from qualified professionals with specific geothermal expertise.

11.5.5 Section 106 RMA

As with other hazards, section 106 of the RMA enables consent authorities to refuse subdivision consent or impose conditions if it considers there is a significant risk of natural hazards. A similar provision is being considered for land use consents under the recent RMA Amendment Bill. However, the term significant risk remains undefined in the RMA, which can complicate implementation.

11.6 Regional Direction for District Plan Geothermal Hazards Provisions

The avoidance or mitigation of the effects of natural geothermal hazards is included as an objective in the Bay of Plenty Natural Resource Plan (GR O7) and the policies and methods indicate that District Councils are responsible for managing these hazards, with the Regional Council's role limited to providing information (GR P14, GR M3, GR M5, GR M6).

11.7 Issues Identified with Geothermal Provisions

Several issues that limit the effectiveness, efficiency, and consistency of geothermal provisions have been identified through technical advice, plan implementation, and consultation, as summarised below:

1. **Inconsistent geothermal system mapping.**
   There are several versions of mapping of geothermal systems, including recent work by the Bay of Plenty Regional Council. This raises the question of whether the District Plan mapping most effectively and efficiently targets management of geothermal hazards.

2. **Uncertainty about the application of subdivision rules**
   SUB-R42 and SUB-S8(2) refer to sites "affected by geothermal activity, geothermal features or bores" but "geothermal activity" is ambiguous. While Plan Change 9 clarified this for the Rotorua Geothermal System, other systems remain unclear.

3. **Inconsistent application of requirements at building stage**
   Rule NH-R8 requires a site-specific geothermal hazard and mitigation assessment at the time of building consent, but this applies only within the Rotorua Geothermal System Overlay. Other systems, despite also posing geothermal risks, are not covered due to limitations in the scope of earlier plan changes. This creates an inconsistent approach to hazard management.

4. **Narrow scope of policy for co-existence with geothermal areas, and lack of connection to objectives and methods.**
   Policy NH-P3 currently refers only to Te Arawa villages of Ōhinemutu and Whakarewarewa. However, feedback from iwi and iwi management plans indicates a broader cultural connection across the Rotorua District, including aspirations for papakāinga housing. The

current policy also does not provide sufficient direction for how to accommodate these values within the context of hazard management.

5. **Implications of 'granny flats' changes**
   The emerging exemptions from building consent and district plan rules for small dwellings creates uncertainty about the respective roles of the District Plan and Building Act frameworks and the continued ability to use rule NH-R8 to mitigate risks to small dwellings.

6. **Geothermal provisions in the Lakes A Zone are not aligned**
   Tin the Lakes A Zone, the policy direction currently seeks to avoid development over geothermal hazards outright, which does not reflect the nuanced approach elsewhere in the plan. The current framework also lacks specific rules for hazard consideration at subdivision and building stages to implement its policy.

11.8 Proposed Changes to Geothermal Hazards Policies, Rules and Mapping

11.8.1 Retain Mapping of Geothermal Systems

In developing this plan change, consideration was given to the appropriateness of current geothermal system mapping for the targeting of management of geothermal hazards. The District Plan relies on geothermal system mapping (Figure 10, Map 212 in the hardcopy version of the District Plan maps) to identify areas where geothermal rules apply. Unlike the other hazard maps, the removal of the geothermal system maps from the District Plan is not considered a viable option, due to the lack of a suitable alternative for identifying where rules should apply.

The extent of geothermal systems has been the subject of several studies that have informed maps of geothermal systems in various planning documents, including the Rotorua District Plan. Most recently, a study by the BOPRC provided updated mapping (Zuquim and Box, 2023). The geothermal system mapping studies focus on the extent of geothermal aquifers rather than geothermal hazards. There are also inconsistencies between the various studies and extents included in planning documents. Nonetheless, they provide a broad indication or 'flag' of areas potentially subject to geothermal hazards.

In consultation with Bay of Plenty Regional Council, no alternative mapping was identified that is more effective and efficient for targeting the management of natural hazards and it is proposed to retain the current geothermal system mapping.

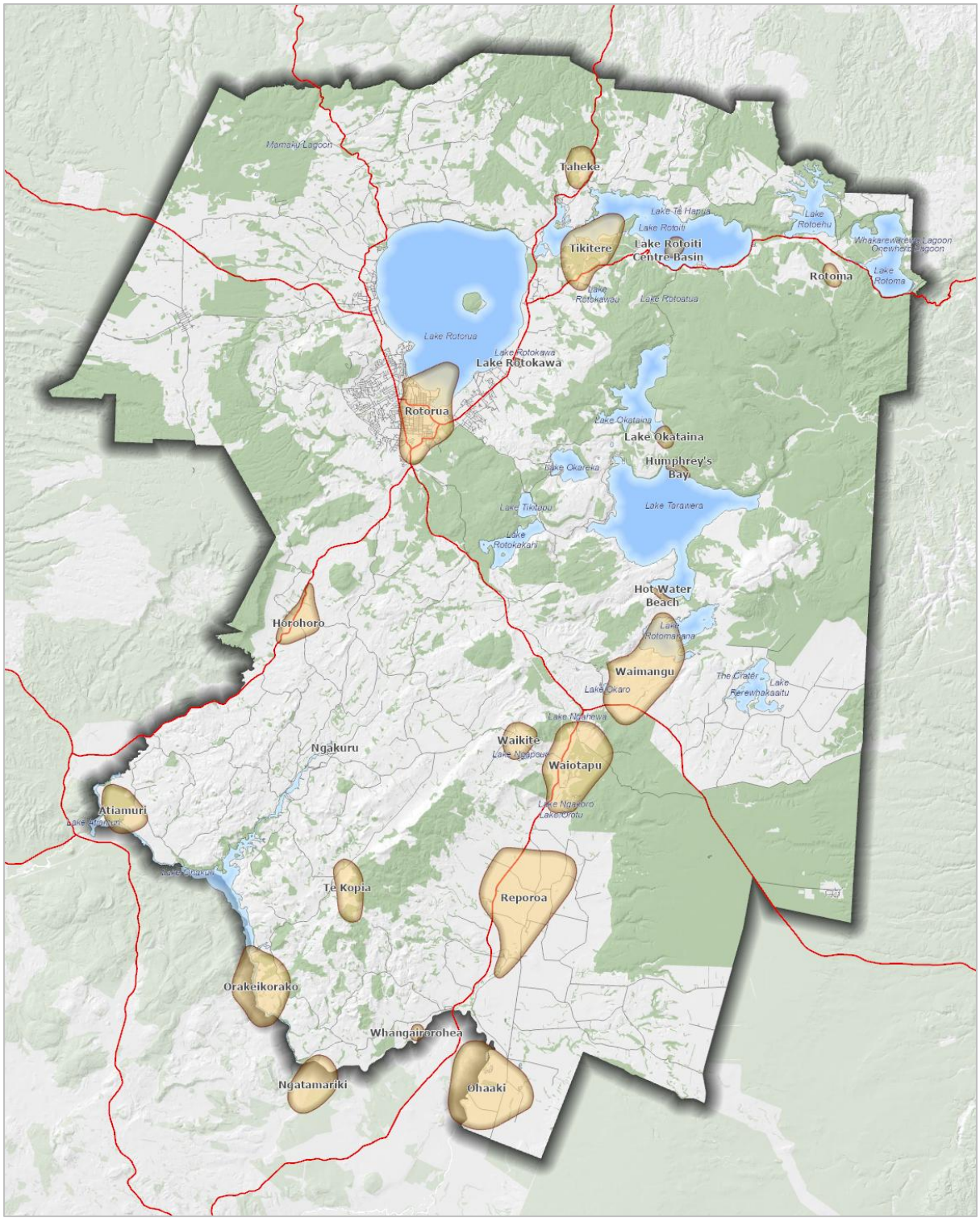


Figure 10 Geothermal Systems mapped in the Rotorua District Plan

11.8.2 Clarify Where Subdivision Rules Apply

Rule SUB-R42 and Performance Standard SUB-S8(2) provide for subdivision as a restricted discretionary activity and require consideration of geothermal risks and measures to address those risks. These provisions currently apply to 'sites affected by geothermal activity, geothermal features or bores. However, the meaning of 'affected by geothermal activity' is ambiguous. It could be

interpreted narrowly (e.g. limited to sites with visible geothermal surface features) or more broadly (e.g. including sites potentially affected by airborne geothermal gases).

To address this ambiguity, Plan Change 9 clarified that these subdivision rules apply to the Rotorua Geothermal System. However, this clarification was not extended to other geothermal systems due to limitations in the scope of that plan change.

To improve certainty and efficiency, this plan change proposes to amend Rule SUB-R42 and SUB-P8(2) so that it applies to sites *'within the Geothermal Systems Overlay or affected by a geothermal feature or bore.'*

11.8.3 Extend the requirement for Hazard and Mitigation Assessment to Other Geothermal Systems

Rule NH-R8, introduced by Plan Change 9, requires the submission of a geothermal assessment report at the time of building consent application for most new buildings and additions located within the Rotorua Geothermal System Overlay. These assessments must be prepared by suitably qualified and experience persons and must identify geothermal hazards present on the site as well as describe how mitigation measures have been integrated into the design to manage risks to people and property both on and off site.

This approach was developed in recognition that while the Building Act and Building Code provide tools to manage geothermal hazards but there was a lack of clarity around non-structural considerations, such as site layout, and the extent to which risks to neighbouring land could be addressed. Rule NH-R8 seeks to complement existing legislative requirements by encouraging early and holistic consideration of geothermal risks in site and building design.

Due to the limited scope of Plan Change 9, Rule NH-R8 was only applied to the Rotorua Geothermal System. This plan change now proposes to extend the application to all areas within the Geothermal Systems Overlay, ensuring consistent assessment and management of geothermal hazards across the Rotorua District, by amending the heading to Rule NH-R8 as follows:

> ***NH-R8 New Buildings and Additions to Building in the ~~Rotorua~~ Geothermal Systems Overlay***

This option is assessed against the current provisions in the table below.

	Option 1: Retain the current provisions – limit NH-R8 to the Rotorua Geothermal System	Option 2: Extend NH-R8 to the whole Geothermal System Overlay
Relevant Objectives (as proposed to be amended)	*SDNH-O1: The risks from natural hazards to people, property and the environment associated with land use, subdivision and development are acceptable* *SDNH-O2: Land use, subdivision and development is resilient to the current and future effects of climate change*	
Efficiency and Effectiveness of Achieving Objectives	Less effective - The building consent process already provides an opportunity to consider geothermal hazards to some extent but is more limited in the matters that can be considered than under NH-R8,	More effective - Promotes comprehensive consideration of geothermal hazards at the time of building across all geothermal systems,

	focusing on building work and not outdoor spaces, site treatment and impacts on neighbouring properties.	addressing gaps in the Building Act/Building Code. Efficiency has been optimised by building on existing processes and assessments (Geotech reports) using the performance standard approach and providing guidance to support the assessments.
Costs and Benefits	Approach is inconsistent across different geothermal systems, which can be seen as unfair.	Assessments may add costs but most building consents are already expected to be supported by an expert geotechnical assessment and the assessments are expected to usually be undertaken by this expert with limited additional costs. In some cases, where hazards are identified, specialist geothermal expertise could potentially be needed, but if so, this is likely to have been needed to address the Building Code in any case.
Risks of acting or not acting if insufficient information	Geothermal hazards are not well understood / mapped at a site level and rule NH-R8 promotes site-specific consideration.	

11.8.4 Clarify and Broaden the Policy for 'Co-existence' with Māori settlements

Current policy NH-P3 is considered too narrow in scope. Consultation with iwi and consideration of iwi management plans has highlighted that connections between Māori and geothermal areas are not limited to Ōhinemutu and Whakarewarewa and traditional settlements were located in geothermal areas throughout the district, although some have now been lost. Iwi also discussed that mana whenua may seek to foster connections with geothermal resources, for example, with papakāinga in geothermal areas

Additionally, the existing policy lacks specificity on how such co-existence is to be enabled in a practical sense within the District Plan methods. It is considered that it would increase certainty and a stronger connection to the proposed objectives would be achieved by amending the policy to explicitly acknowledge the need to take these cultural connections into account when assessing whether geothermal risks are acceptable. This would provide clearer guidance in situations where discretion over natural hazard management is exercised – for example, when proposed building does not to meet the standards for setbacks from geothermal features.

> ~~*NH-P3: Enable the continued co-existence of residential activities in the Te Arawa villages of Ōhinemutu and Whakarewarewa with the geothermal features throughout each village, whilst ensuring future development is undertaken with an acknowledgement of risks.*~~
>
> *NH-P3: Take into account the cultural significance of co-existing with geothermal activity in any assessment of geothermal hazard risk associated with development in papakāinga and traditional Māori settlements, such as the Te Arawa villages of Ōhinemutu and Whakarewarewa.*

11.8.5 Additional Rule for Small Dwellings

Changes to the RMA and Building Act to enable small dwellings without the need to apply for building consent and resource consent bring into question the use of NH-R8 to encourage good design to mitigate the risks.

The Building and Construction (Small Standalone Dwellings) Bill, which proposes changes to the Building Act, limits the exemption from building consent requirements where natural hazards affect a site. However, geothermal hazards are not covered by the Building Act's definition. Therefore, it is understood that small dwellings on sites affected by geothermal hazards could proceed without building consent, which is the primary method for managing geothermal hazards. Furthermore, Rule NH-R8, which seeks to complement the Building Act process by requiring an assessment of geothermal hazards at the time of building consent, would also not apply.

To address this gap, a new clause (4) to Rule NH-R8 is proposed to require resource consent as a restricted discretionary activity for new buildings and additions over 20m^2 where building consent is not sought. Further consequential changes are also proposed to clarify what is permitted under Rule NH-R8. These changes may require further consideration once the detail of legislative changes is more certain.

<table>
<tr><th colspan="3">NH-R8 New Buildings and Additions to Building in the ~~Rotorua~~ Geothermal Systems Overlay</th></tr>
<tr><td><u>Applicable Spatial Layers</u>
<u>Geothermal Systems Overlay: All Zones</u></td><td colspan="2"><u>1.</u> <u>Activity Status:</u> <u>Permitted</u>
<u>Where:</u>
<u>The activity is an addition to an existing building that does not increase the building footprint by more than 20m^2</u></td></tr>
<tr><td>Applicable Spatial Layers
~~Rotorua~~ Geothermal Systems Overlay: All Zones</td><td>2. Activity Status: Permitted
<u>Where:</u>
<u>A building consent can be sought for the activity and is sought.</u>
Performance Standards:
a. A report by a suitably qualified and experienced person shall be submitted at the time of application for building consent, which identifies the extent of geothermal hazards on the site, including:
i. Geothermal surface features;
ii. Geothermal gas;
iii. Heated ground;
iv. Corrosive ground,
v. Ground collapse; and
vi. Bores and other geothermal infrastructure.</td><td>3. Activity Status: Restricted Discretionary
Where:
Compliance is not achieved with the performance standards for NH-R8(1)
Matters of Discretion:
a. Measures to manage the risks to people and property on and off site from geothermal hazards.</td></tr>
</table>

	b. A report or reports by a suitably qualified and experienced person shall also be submitted at the time of application for building consent detailing how measures to mitigate geothermal risks to people and property on the site and surrounding sites have been incorporated into the design of the development, such as: *i. Building design;* *ii. Site layout and design, for example locations of venting structures, yards and outdoor living space; separation between buildings; surface treatment; fencing materials; and maintenance of access to bores;* *iii. Limits on impervious surface site coverage; and* *iv. Stormwater management* ~~*Exception:*~~ ~~*This rule does not apply to alterations that do not increase the building footprint by more than 20m².*~~	
Applicable Spatial Layers *Geothermal Systems Overlay: All Zones*	***4 Activity Status: Restricted Discretionary*** ***Where:*** *a. The activity is a new or residential unit or an addition to a residential unit that increases the building footprint by more than 20m²; and* *b. No building consent is sought for the activity.* ***Matters of Discretion:*** *a. Measures to manage the risks to people and property on and off site from geothermal hazards.*	

11.8.6 Align Approach to Geothermal Hazards in Lakes A Zone

Developments around geothermal hazards are likely to be less of an issue in the Lakes A Zone than in locations such as Rotorua city and Tikitere because any hazards are likely to be concentrated in less developed forestry, reserve and pastoral areas (using geothermal system boundaries and geothermal 'occurrences' as a guide to hazard locations). Nonetheless, buildings vulnerable to geothermal hazards could occur.

It is, therefore, proposed to extend the proposed Policy NH-P3, Policy NH-P4, and geothermal rules NH-R6 (setbacks from geothermal surface features and bores) and NH-R8 (geothermal assessment at the time of building) to the Lakes A Zone. This change would be implemented by including

information on the applicability of the Natural Hazards chapter to the Lakes A Zone in relevant parts of the District Plan, including the Lakes A Zone, as set out for flooding.

Policy 13.2 of the Lakes A Zone is proposed to be deleted because the geothermal-specific policy would instead be addressed in the main part of the District Plan. In any case, it is considered that avoidance of all geothermal hazards is not always necessary, and the hazards can, in some instances, be mitigated. For example, with building design.

~~*Policy 13.2 To avoid use and development over and by geothermal hazards.*~~

Insertion of additional standards in the General Subdivision Standards for sites susceptible to flooding or geothermal activity, so that a stricter activity status would be triggered similar to the main part of the District Plan, has also been considered. However, as there are no permitted or controlled subdivision activities in the Lakes A Zone, this is not considered necessary. Instead, it is proposed to amend the matters of discretion for restricted discretionary subdivision, to ensure natural hazards can be addressed (see 12.1.1 below).

The table below provides an analysis of these changes:

	Option 1: Retain current provisions: 1. Policy 13.2 is retained, which seeks avoidance of geothermal hazards. 2. No specific land use rules apply for geothermal hazards. 3. Building platforms are required to be located outside areas of instability as a performance standard. 4. No specific subdivision rules or discretions apply. 5. Subdivision in some Settlement Management Areas is a discretionary activity, providing scope to consider geothermal hazards, but there is no scope in other areas that contain geothermal systems. 6. Geothermal hazards can be considered in building consent applications under Building Code clauses relating to structural stability, hazardous agents and durability.	Option 2: Align geothermal hazard provisions in the Lakes A Zone with the rest of the District Plan: 1. Delete Lakes A Zone Policy 13.2. 2. Extend amended Policy NH-P3, Policy NH-P4 and rules NH-R6 (setbacks from geothermal surface features and bores) and NH-R8 (geothermal assessment at the time of building) to the Lakes A Zone. 3. Include an additional discretionary subdivision rule in the Lakes A Zone for subdivision of sites within the Geothermal Systems Overlay or affected by geothermal features or bores. 4. Building Code clauses continue to remain relevant to building in geothermal areas.
Relevant Objectives (as proposed to be amended)	*SDNH-O1: The risks from natural hazards to people, property and the environment associated with land use, subdivision and development are acceptable* *SDNH-O2: Land use, subdivision and development is resilient to the current and future effects of climate change*	

Efficiency and Effectiveness of Achieving Objectives	While the building consent process already provides an opportunity to consider geothermal hazards, it is more limited in the matters that can be considered under NH-R8.	While development may not often occur close to geothermal features, extending NH-R6 assists to ensure associated risks are considered. NH-R8 promotes comprehensive consideration of geothermal hazards at the time of building across all geothermal systems, addressing gaps in the Building Act/Building Code. Efficiency has been optimised by leveraging existing processes and assessments (Geotech reports) using the performance standard approach and providing guidance to support the assessments. There is some risk of rules being missed and confusion about what rules apply due to structure of the District Plan, but this is reduced through cross references. While discretion over natural hazards already applies to subdivision in most management areas, the proposed discretionary activity rule assists to ensure geothermal hazards are considered.
Costs and Benefits	Avoidance of geothermal hazards promoted by Policy 13.2 is not always needed to achieve the objectives and could have opportunity cost. Approach to management of geothermal hazards is not consistent across the District, which can be seen as unfair.	Assessments to meet NH-R8 may add costs but these are expected to be limited. Most building consents are already expected to be supported by an expert geotechnical assessment. This expert will usually undertake the assessment for NH-R8 at the same time. In some cases, where hazards are identified, specialist geothermal expertise could potentially be needed, but if so, this is likely to have been needed in any case to support the building consent application.
Risks of acting or not acting if insufficient information	Geothermal hazards are not well understood / mapped at a site level and rule NH-R8 promotes site-specific consideration.	

12. Ētahi Atu Panonitanga - Other Changes

12.1.1 Other Subdivision Changes

Issue SUB-I2 is proposed to be amended as follows to improve consistency in terminology and remove discussion of methods for addressing the issue, which are not considered appropriate for an issue statement.

SUB-I2 Natural and manmade constraints

~~*The RMA provides council with the ability to refuse subdivision consent in circumstances where land is, or is likely to be, subject to material damage by erosion, falling debris, subsidence (including liquefaction), slippage, or inundation from any source. In the Rotorua District, geothermal activity can be a factor in erosion, subsidence or inundation. Other significant*~~ *s*~~*S*~~*ite suitability issues for* ~~*subdivision in*~~ *Rotorua include:*

~~*1. Geothermal activity*~~

~~*2. Young soils that are highly erodible*~~

~~*3. Catchments with short duration, high intensity storm events*~~

~~*4. Ephemeral gully systems*~~

~~*5. Lake edge inundation*~~

~~*6. Surface water inundation*~~

~~*7. Fault lines*~~

~~*8. Liquefaction*~~

~~*9. Historic and present lake and stream margins*~~

1. *High Water tables.*
2. *Flooding from high lake levels, rivers/streams overflowing, surface water inundation, ephemeral streams and overland flowpaths.*
3. *Land stability (including landslides, liquefaction and soft, compressible soils)*
4. *Young, erodible soils*
5. *Geothermal hazards*
6. *Potential for wildfire*

~~*Conditions can be imposed on subdivision or land use consents to mitigate the risk of human generated hazards, such as contamination, or natural hazards. Where the effects cannot be mitigated, consent may not be granted. However, there are areas where there are strong cultural associations with living in active geothermal systems where hazards are accepted. The villages of Ōhinemutu and Whakarewarewa are of high geothermal activity that are subject to special management.*~~

The following objective for 'natural and man-made hazards' is consistent with the proposed strategic objectives and is not proposed to be amended:

SUB-O3 Subdivision where man-made and natural hazard risk does not exceed acceptable levels.

Policies SUB-P6 is considered consistent with the objectives and appropriate but SUB-P7 is proposed to be deleted because the detailed policies for specific natural hazards in the Natural Hazards Chapter (NH) are considered sufficient.

SUB-P6 Require that applications for subdivision demonstrate that man-made and natural hazard risk does not exceed acceptable levels

~~*SUB-P7 Restrict subdivision where land is subject to natural hazards, including:*~~

~~*1. Flooding*~~

~~*2. High water tables*~~

~~*3. Geothermal activity*~~

~~*4. Subsidence (including liquefaction)*~~

~~*5. Slippage*~~

~~*6. Falling debris*~~

~~*7. Erosion*~~

~~*8. Soil instability*~~

~~*9. Fault lines*~~

~~*10. Liquefaction*~~

~~*Such that the site would be unusable or unsafe or that the natural hazard risk exceeds acceptable levels*~~

It is also proposed to include 'the extent to which natural hazard risks are avoided or mitigated and the worsening of any hazard' as a general matter of control, discretion and assessment criteria for subdivision (SUB-MC1, SUB-MD2, SUB-AC1).

While these additions may introduce some uncertainty for applicants and potentially increase assessment costs, they create a clearer framework for identifying and managing natural hazard risks through the subdivision process. It is also noted that natural hazard considerations are already considered under section 106 of the RMA, even where not explicit matter of control or discretion exists. As such, the anticipated increases in uncertainty and cost are expected to be minimal.

Although natural hazard objectives and policies already guide Rotorua Lakes Council's discretion for fully discretionary activities, adding these considerations to the assessment criteria helps reinforce their importance. This can serve as a useful prompt to applicants, potentially improving the quality of applications and the efficiency of the consent process.

In the Lakes A Zone, it is proposed to also include 'the extent to which natural hazard risks are avoided or mitigated and the worsening of any hazard' as a matter of discretion for all restricted discretionary subdivision where natural hazards is not currently a matter of discretion; and to replace matter of discretion 38.1.1 for the Sensitive Rural Management Area "Assessment of risk under section 106 of the RMA and in particular any risk to building platforms from: geothermal activity, erosion, subsidence, slippage, inundation, seismic activity, or flooding (including from ephemeral watercourses" .

In the Lakes A Zone, it is further proposed to:

- Include 'the extent to which natural hazard risks are avoided or mitigated and the worsening of any hazard' as a matter of discretion for all restricted discretionary subdivision activities where natural hazards are not currently specified as a matter of discretion; and
- Replace existing matter of discretion 38.1.1 for the Sensitive Rural Management Area, which reads 'Assessment of risk under section 106 of the RMA, particularly any risk to building platforms from geothermal activity, erosion, subsidence, slippage, inundation, seismic

activity, or flooding (including from ephemeral watercourses)', with the same matter of discretion for consistency.

12.1.2 Matters of Control/Discretion and Assessment Criteria

As a consequence of the proposed removal of hazard mapping from the District Plan, it is necessary to broaden the language used in the matters of control, discretion, and assessment criteria for land use activities in relation to natural hazards. Current, wording refers to 'adverse effects from natural hazards or the worsening of any hazard identified on the planning maps.' It is proposed that this wording be updated to 'The extent to which natural hazard risks are avoided or remedied and the worsening of any hazard.'

This change is also considered to encourage a more proactive response of considering how to avoid or mitigate natural hazard risks.

To improve efficiency and reduce duplication, the following clauses are also proposed for removal:

- Clauses in the generic natural hazards matters of control and discretion and assessment criteria throughout the plan relating requiring a flood risk assessment (for example, in RESZ-MC5(2)). These may inadvertently suggest that expert assessment is only be required in relation to flood hazards.
- Clauses that require assessments of faults and mitigation options in the generic natural hazard matters of control and discretion in in reserve zones. It is considered that this duplicates the fault rupture hazard area rules.
- Duplicated natural hazard assessment criteria in Reserve Zones.

13. Te Kupu Whakakapi – Conclusion

A review of provisions for managing specific natural hazards through the Rotorua District Plan has supported this proposal to replace the strategic objectives and policies for natural hazards and to make a focussed suite of changes to policies and rules. These proposed changes affect the Natural Hazards chapter (NH), Subdivision chapter (SUB), Earthworks Chapter (EW), Lakes A Zone, District Plan maps, as well as performance standards and matters of control/discretion and assessment criteria in other chapters.

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Āpitihanga 1- Appendix 1: Annotated Extracts of the District Plan showing Proposed Changes to the Text

[Appendix is provided as separate document]

Āpitihanga 2 - Appendix 2: Proposed Changes to District Plan Maps

The following changes are proposed:

- Removal of the mapping of soft ground potential (map 209 in the hardcopy/static pdf series)
- Removal of the mapping of fault traces and the Fault Avoidance Overlay (map 210 in the hardcopy/static pdf series)
- Removal of the mapping of landslide susceptibility (map 211 in the hardcopy/static pdf series)