Consultancy Report 2025/02 LR
Project No: COMN0322
Confidential 2025

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14 March 2025

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Attention: Kim Smith

Dear Kim,

Active fault mapping and Fault Avoidance Zones for Rotorua Lakes District: an update

1.0 Introduction and Scope

This report provides an update to active fault mapping for Rotorua Lakes District. With widespread acquisition of high-resolution Light Detection and Ranging (LiDAR) topographic data now available across the entire district, this study supersedes the previous district-wide fault mapping conducted by Villamor et al. (2010).

New Fault Avoidance Zones (FAZs) have been developed following the Ministry for the Environment's guidelines titled 'Planning for Development of Land on or Close to Active Faults' (Kerr et al. 2003), hereafter referred to as the 'MfE Guidelines'. The MfE Guidelines promote a risk-based approach for dealing with ground-surface fault rupture hazard, and, at a specific site, the hazard is characterised by two parameters:

1. Geometry, including location and complexity of surface rupture of the fault.
2. Activity of the fault, as measured by its average recurrence interval of surface rupture.

High-resolution active fault surface traces and FAZs have been developed for all mapped active faults within the district, with the exception of any faults crossing large water bodies (e.g. lakes). These are supplied via the 'active faults' web service available on the GNS Science ArcGIS server[1], which can also be viewed on the New Zealand Active Faults Database (NZAFD) webmap.[2] For a detailed description of these high-resolution layers on the active faults web service and NZAFD webmap, please see Morgenstern et al. (2024).

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[1] https://gis.gns.cri.nz/server/rest/services/Active_Faults/NZActiveFaultDatasets/MapServer

[2] https://data.gns.cri.nz/af/

2.0 Fault Mapping

The primary LiDAR data utilised in this report were collected across the Bay of Plenty region between 2019 and 2022 and processed into a 1 m resolution bare-earth Digital Elevation Model (DEM; LINZ 2021). Hillshade models were created using northwest, north and northeast illumination orientations, which were consulted for this study.

For this study, FAZs were developed by first identifying and mapping fault traces (Section 2.1) and then creating locational uncertainty zones and setback distances around these traces (Section 2.2) in accordance with the recommended procedures in the MfE Guidelines.

2.1 Fault Traces

Fault traces occur where past ruptures of a fault at depth have broken though to, and torn, the ground surface. It is the mitigation of the hazard posed by this tearing of the ground surface that is the intended aim of the MfE Guidelines.

In this study, 41 named active faults were defined or re-defined, as well as a number of unnamed traces (Figure 2.1). For this, LiDAR data, aerial imagery and previous active fault mapping (Villamor et al. 2010; Clark et al. 2019; Litchfield et al. 2020; Clark et al. 2021; Clark and Villamor 2022; Villamor and Litchfield 2024; Leonard et al., in prep.) were consulted. Fault-trace mapping was undertaken at approximately 1:2000–1:5000 scale, where possible.

A number of consultancy reports provided by Rotorua Lakes Council, as well as published academic papers, were also consulted, and this information was used to improve and update the fault mapping (e.g. fault location uncertainty, fault activity attributes) where appropriate (see Table A1.1 in Appendix 1 for a list of these documents).

In the Taupō Volcanic Zone (TVZ), it can be difficult to (1) identify active faults at the surface via desktop-only studies and (2) classify their activity. In most regions, the interplay between tectonic (fault rupture) and landscape (erosion and sedimentation) processes over time can modify the topographic expression of a fault (fault scarp). Additionally, in volcanic regions, faults can be harder to map due to extensive, thick eruption deposits mantling the landscape after an eruption, as well as increased erosion-sedimentation periods associated with the eruption aftermath. In areas within Rotorua Lakes District close to the nearby Okataina Volcanic Centre (OVC), large recent (i.e. the past ~26,000 years) eruptions can hinder fault expression. Also, in the lower topographic areas (valleys and basins) in the south of the district, deposits from the Taupō eruption (c. 1800 years ago, from the Taupō Volcanic Centre >35 km away) and its aftermath are thick and have often buried the fault surface expression.

Additionally, despite the use of high-resolution LiDAR data, it can be difficult to interpret faults in areas of dense vegetation. Fault scarps, fault-guided geomorphic features (e.g. eroded valleys with topographic offsets across them) and short gaps where traces are inferred to join, but that have been eroded or concealed, have been mapped where possible. The locational accuracy and tectonic origin (certainty that the feature is a fault) of each trace has been recorded in the GIS. All faults in the district have been classified as having a predominantly normal[3] slip type, due to the active extensional tectonic stresses in the TVZ. Table 2.1 provides definitions of the terms used in this report and accompanying GIS.

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[3] The following link on the GNS Science website provides a description and explanation of the different types of faults (e.g. normal, reverse and strike-slip):
http://www.gns.cri.nz/Home/Learning/Science-Topics/Earthquakes/Earthquakes-and-Faults/Different-types-of-Faults

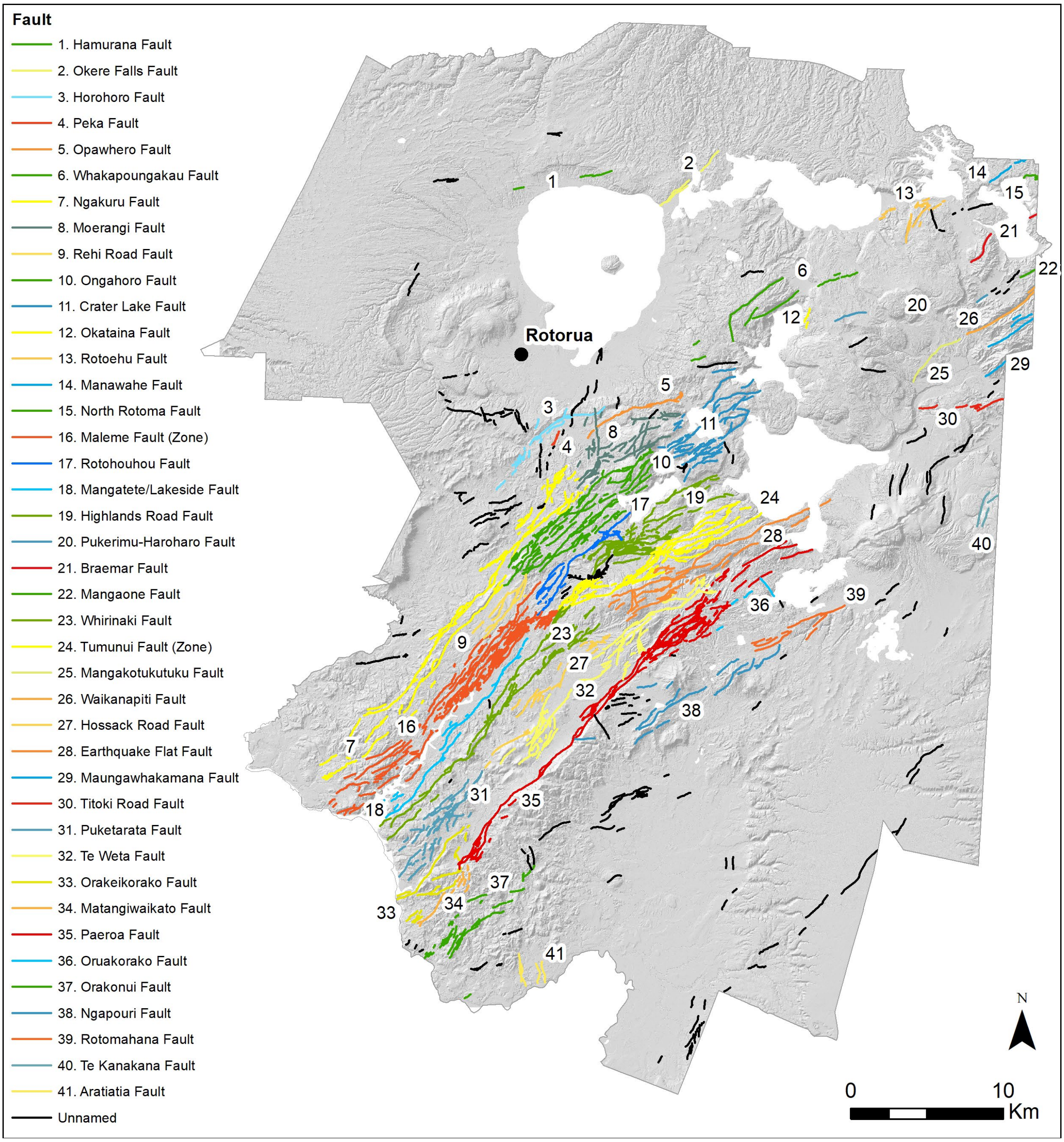

Figure 2.1 New fault trace mapping within the Rotorua Lakes District using hillshade models based on 2019–2022 LiDAR data (LINZ 2021). The new mapping (labelled from northwest to southeast) has not been interpreted outside the district boundary or across large water bodies, such as lakes (white areas within the district boundary).

Table 2.1 Definitions for the terms used in this report and accompanying GIS data.

Attribute	Definition
Fault	The name given to the active fault
Accuracy	Locational accuracy of the fault trace – accurate (used where location of a trace can be established to within c. 100 m); approximate (used where a fault cannot be located accurately due to shortcomings of the fault expression [e.g. an eroded scarp or modified scarp]); concealed (used where a fault is known to exist but is concealed beneath younger materials); inferred (used where geological relationships or geomorphic features (e.g. saddles, guided streams, line of springs) strongly suggest the existence of a fault)
Tectonic origin	The likelihood that the feature is an active fault – definite; likely; possible; unknown
Dominant slip type	Dominant or primary sense of movement on the fault – all normal dip-slip in this study
Method	Method used to locate the fault trace – all LiDAR in this study
Activity	Activity of the fault – active (evidence of surface rupture and/or ground deformation in the past 125,000 years); possibly active (no definitive evidence that the fault is active based on LiDAR analysis)
Fault complexity	Classification based on width and distribution of the land deformation caused by ground-surface fault rupture – well defined; well-defined extended; distributed; uncertain constrained; uncertain poorly constrained (see Table A2.3 for definitions)
Deformation width	Visible deformation width of scarps (i.e. 'fault complexity') in metres. Represents the zone of uncertainty in the location of future intense ground deformation
Buffer distance	Half of the 'deformation width' in metres
Fault Avoidance Zone (FAZ)	Sum of the 'deformation width' plus the 20 m setback zone in metres
Recurrence Interval (RI) Class	Classification based on the average time between surface-rupturing events on a fault – Class I (≤2000 years); Class II (>2000 years to ≤3500 years); Class III (>3500 years to ≤5000 years); Class IV (>5000 years to ≤10,000 years); Class V (>10,000 years to ≤20,000 years); Class VI (>20,000 years to ≤125,000 years)

2.2 Fault Avoidance Zones

For this study, FAZs were constructed for all fault traces in the district following the methods below.

The FAZs are comprised of two parts: (1) the uncertainty of the exact location of the surface trace and (2) the setback. For the first part, the exact location of the fault at the ground surface can only be determined accurately when it is exposed (e.g. research trench, road cut or natural exposure). Therefore, a buffer was constructed around each surface trace that represents the uncertainty in the location (and width) of the possible future ground-rupture deformation, hereafter referred to as the 'fault deformation width' (Figure 2.2), assuming that future rupture is likely to be located where past rupture has occurred. This area includes all ground-surface deformation associated with fault rupture but does not include ground-shaking hazards or secondary effects from earthquakes, such as liquefaction or landslides. In practise, the fault deformation width is derived from the scarp width. The fault deformation width within the district varies between 2 and 310 m.

The second step is to add a 20-m-wide setback zone from this fault deformation width, as recommended by the MfE Guidelines, to account for possible sub-resolution secondary deformation. These zones (fault deformation width plus setback) represent the full FAZs. Each FAZ is also assigned a 'fault complexity' classification (Figure 2.2), as per the MfE Guidelines.

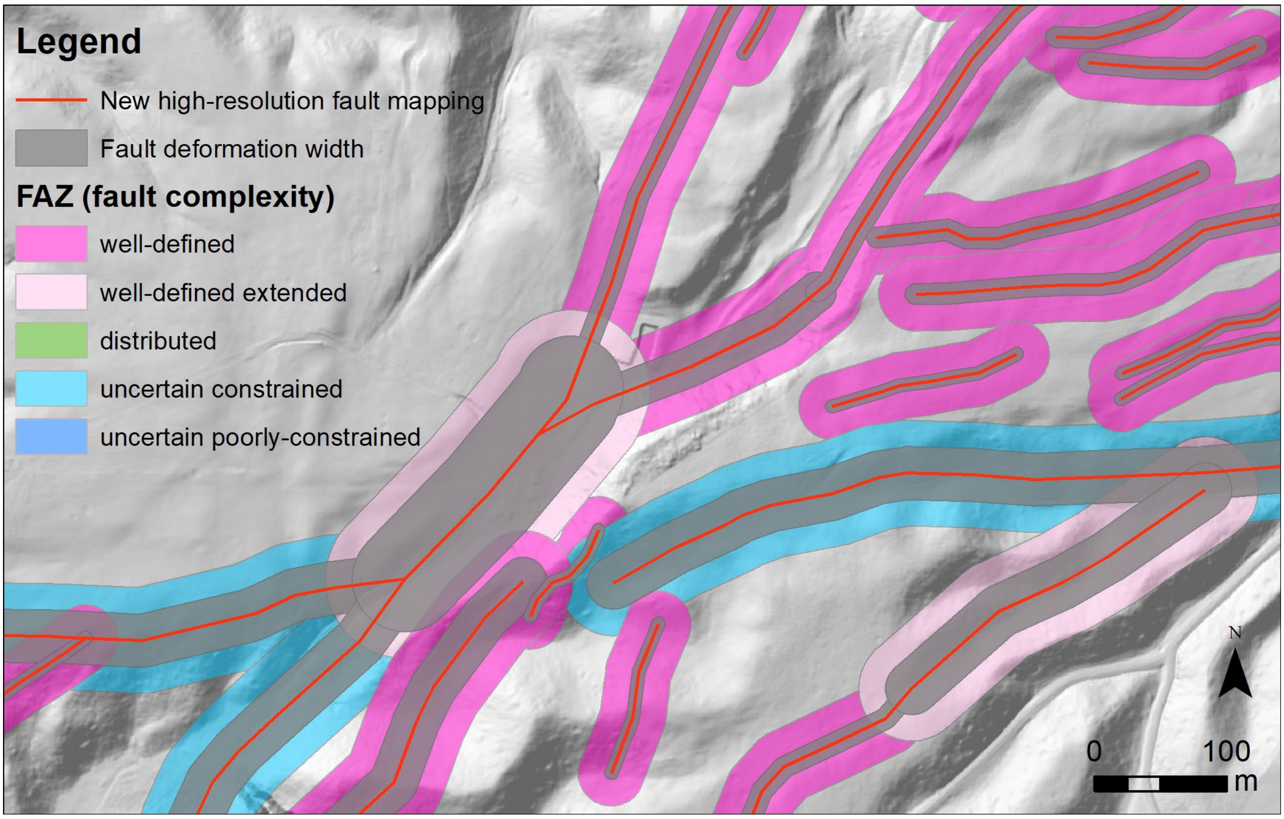

Figure 2.2 An example of FAZs constructed for fault traces in the Rotorua Lakes District, overlying a hillshade model based on 2019–2022 LiDAR data (LINZ 2021).

3.0 Recurrence Interval Classes

Recurrence Interval (RI) Classes used in this study may differ from those presented in Villamor et al. (2010). Since that report, we have improved the approach because, in many cases in the district, the single (main) fault plane that constitutes a crustal fault at depth splays upwards into multiple planes closer to the ground surface that may intersect the ground as several parallel traces (fault zone). However, when the main fault plane ruptures, not every individual surface trace associated with it will rupture. Most of the available values of fault rupture recurrence interval are the combined rupture of the surface traces. This is because that value is needed for shaking hazard analysis (e.g. national seismic hazard). However, for ground surface rupture hazard, the value that is appropriate is the one associated with each individual trace, which is usually larger (longer recurrence, less hazard) than the combined values. Villamor et al. (2010) assigned some published combined recurrence intervals to all of the individual splays, which could lead to misinterpretations.

The new updates are:

- We have removed the combined recurrence interval values from Villamor et al. (2010) that were assigned to individual traces when not appropriate.
- For traces where we could assess an individual recurrence interval using published literature (e.g. clear data from a fault trench across an individual trace), we have estimated the recurrence interval and applied it to the trace (and often also to adjacent traces that we inferred have similar activity based on their geomorphology).
- We have updated recurrence interval values based on new results from some consultancy reports.

Updates from consultancy reports and published literature are summarised in Table A1.1.

There are still many traces in the district without a RI Class, perhaps less than in the dataset provided by Villamor et al. (2010). However, we believe the few values provided here are more appropriate and useful for planning purposes.

4.0 Summary and Recommendations

Surface traces of active faults have been defined or re-defined within the Rotorua Lakes District and were mapped at scales between 1:2000 and 1:5000 (where possible) using a high-resolution DEM derived from LiDAR data. Each trace has key attribute information, and FAZs were developed following the MfE Guidelines.

The high-resolution NZAFD and active faults web service maintained by GNS Science have been updated with data from this study. It is appropriate to use these data at cadastral scales relevant for planners, policy-makers and landowners to make decisions about land use on or close to active faults and for provision of information in Land Information Memorandums.

RI Classes have been assigned, where possible, using previously published rates of fault activity, and faults within the district fall into RI Classes between I (≤2000 years) and IV (>5000 years to ≤10,000 years). One exception exists where a section of the Crater Lake Fault has been assigned an RI Class of VI (>20,000 years to ≤125,000 years).

Based on the findings in this report, GNS Science recommends that Rotorua Lakes Council:

- Replace any active fault datasets currently held and being used by Rotorua Lakes Council with those from this study, preferably via the active faults web service, which is hosted and maintained by GNS Science and will be updated when new information is provided. A detailed description of how to connect to this service can be found in Morgenstern et al. (2024). This high-resolution data can also be viewed via the NZAFD webmap at https://data.gns.cri.nz/af/.
- Include all FAZs developed in this study in the Rotorua Lakes District Plan and in any other planning or hazard information maps for Rotorua Lakes District.
- Develop planning provisions using the information provided in this report, including guiding principles and the risk-based decision-making tools of the MfE Guidelines (see Appendix 2 for more information on how to combine RI Class and fault complexity with Building Importance Category).

Obtain better constraints on RI Class, especially for active faults in areas where future population growth and/or infrastructure expansion is expected. This could be achieved through a combination of site-specific paleoseismic (trenching) studies and more detailed analysis of fault-scarp height and morphology using LiDAR data.

Yours sincerely,

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APPENDIX 1 Table of Reviewed Reports and Literature

Table A1.1 Consultancy reports and published literature reviewed for this study. FAZ = Fault Avoidance Zone.

Fault(s)	Consultant	Reference	Date	Investigation	Action Taken
Whirinaki	Stratum Consultants	ECM_20472011_v1_SD23-010051	18/06/2024	60-m-long trench	New fault with 20 m setback added from newly found fault line in report.
Peka	Stratum Consultants	ECM_20336291_v1_SD24-010128	25/03/2024	Literature review	RI Class added.
Hamurana	BSK Consulting Engineers	ECM_19979634_v2_BC23-010342	1/12/2021	Fault location distance assessed (>350 m away)	Checked fault location.
Crater Lake	Berryman Research and Consulting	ECM_19998604_v1_LU23-010042	2/10/2023	Geomorphology	RI Class added.
Crater Lake	Berryman Research and Consulting	2025/02/2	7/2/2025	Geomorphology	RI Class amended for this section of fault.
Mangatete / Lake side and Whirinaki	Tetra Tech Coffey	ECM_19377236_v1_SD-018507	26/05/2023	Two trenches, 30 m long, at the proposed building platform sites	Two fault traces have been removed.
Okere Falls	Tetra Tech Coffey	ECM_12503912_v1_RC18566	2/06/2022	Trenches and faces: total of 70 m long, 1.9 m deep	FAZ narrowed based on report.
Okere Falls	Tetra Tech Coffey	ECM_2209635_v2_BC84212	3/03/2023	Trenches and faces: total of 70 m long, 1.9 m deep	FAZ narrowed based on report.
Ngakuru	DB Consulting Engineers	ECM_3539416_v1_RC16862	15/01/2020	Mapping review	New FAZ located away from building.
Ngakuru	-	ECM_3529755_v1_RE	-	Mapping review	New FAZ located away from building.
Unnamed	Sigma	ECM_3448066	21/05/2019	Mapping review	Fault has been removed.
-	GNS Science	ECM_3421448	9/02/2018	FAZ	Checked, no fault at this location.
Tumunui	Stratum Consultants	ECM_3364155	11/09/2018	Mapping review	Checked – building within FAZ.
-	Stratum Consultants	ECM_3143586	1/02/2017	Mapping review and site visit	Checked, no fault at this location.
Tumunui	Coffey Geotechnics	ECM_3060188	19/09/2012	Three trenches across building platform and 20 m beyond it	FAZ reduced on studied faults based on report.

Fault(s)	Consultant	Reference	Date	Investigation	Action Taken
Hamurana	Berryman Research and Consulting	ECM_2207274_v1_RC18537	8/02/2023	Review of maps, geology and geomorphology	RI Class added.
Ngakuru	Tetra Tech Coffey	ECM_2150622	20/08/2021	Three trenches, ~30–50 m in length and 1.2–1.5 m deep	Tectonic origin unknown, but trench could suggest RI Class > I (trench was shallow).
Rehi Rd	Stratum Consultants	ECM_1732614_v2_232740	16/11/2020	Three trenches, ~30–50 m in length and 1.2–1.5 m deep	Moved fault to west based on lack of displacement of sinter. Trench could have missed the fault. Trenches were shallow.
-	GNS Science	CR2018/143 (Clark et al. 2019)	1/03/2019	Desktop study	Checked, no fault at this location.
Unnamed	GNS Science	CR2018/143 (Clark et al. 2019)	1/03/2019	Desktop study	Fault traces and FAZs remain as per report results.
-	GNS Science	CR2018/143 (Clark et al. 2019)	1/03/2019	Desktop study	Checked, no fault found.
-	GNS Science	CR2018/143 (Clark et al. 2019)	1/03/2019	Desktop study	Checked, no fault found.
Peka, Horohoro	GNS Science	CR2018/143 (Clark et al. 2019)	1/03/2019	Desktop study	Previous FAZ maintained, but with addition of newly identified northeast trace; small traces of Horohoro Fault maintained/ modified, but FAZ widths reduced.
Opawhero and unnamed	GNS Science	CR 2021/44LR (Clark et al. 2021)	10/06/2021	Desktop study	Faults 2a and 2b removed. RI Class of Opawhero Fault and faults 1 and 3 added with FAZs modified and generally reduced in width.
Hamurana	GNS Science	CR 2022/79LR (Clark and Villamor 2022)	13/07/2022	FAZ desktop study	RI Class added to fault.
Ngakuru	GNS Science	CR 2014/282LR (Villamor 2014)	20/11/2014	FAZ desktop study	Fault now removed.
Paeroa and Ngapouri	Research paper	Berryman et al. (2022)	2022	Paleoseismic trenching	Recurrence interval added to trenched traces and some other fault traces.
Whirinaki	Research paper	Canora-Catalán et al. (2008)	2008	Paleoseismic trenching	Recurrence interval added to trenched traces and some other fault traces.
Whirinaki	Research paper	Loame et al. (2019)	2019	Paleoseismic trenching	Recurrence interval added to trenched traces and some other fault traces.

Fault(s)	Consultant	Reference	Date	Investigation	Action Taken
Horohoro	Research paper	Zachariasen and Van Dissen (2001)	2001	Paleoseismic trenching	Recurrence interval checked and okay.
Rotohouhou	Research paper	Nicol et al. (2010)	2010	Paleoseismic trenching	Recurrence interval checked and okay.
Ongahoro	Research paper	Nicol et al. (2010)	2010	Paleoseismic trenching	Recurrence interval added to trenched traces and some other fault traces.
Maleme	Research paper	McClymont et al. (2009)	2009	Paleoseismic trenching and ground-penetrating radar	Recurrence interval added to trenched traces and some other fault traces based on similar expression.

APPENDIX 2 Building Importance Category, Recurrence Interval Class and the Ministry for the Environment Guidelines

Buildings sited across active faults are very likely to be damaged in a fault-surface-rupturing event. The Building Importance Category (BIC) states the relative importance of assessing the suitability of a building within, or proposed for, a Fault Avoidance Zone (FAZ; Kerr et al. 2003). The BICs listed in Table A2.1 are modified from the New Zealand Loading Standard classifications and are based on risk levels for building collapse according to building type, use and occupancy. Category one (BIC 1) carries the lowest importance and category four (BIC 4) the highest importance.

Table A2.1 Building Importance categories from the MfE Guidelines (taken from Kerr et al. [2003]).

Building Importance Category	Description	Examples
1	**Temporary structures** with low hazard to life and other property	• Structures with a floor area of <30 m^2 • Farm buildings, fences • Towers in rural situations
2a	**Timber-framed** residential construction	• Timber-framed single-storey dwellings
2b	**Normal structures** and structures not in other categories	• Timber-framed houses with area >300 m^2 • Houses outside the scope of NZS 3604 'Timber-Framed Buildings' • Multi-occupancy residential, commercial and industrial buildings accommodating <5000 people and <10,000 m^2 • Public assembly buildings, theatres and cinemas <1000 m^2 • Car parking buildings
3	**Important structures** that may contain people in crowds or contents of high value to the community or pose risks to people in crowds	• Emergency medical and other emergency facilities not designated as critical post-disaster facilities • Airport terminals, principal railway stations, schools • Structures accommodating >5000 people • Public assembly buildings >1000 m^2 • Covered malls >10,000 m^2 • Museums and art galleries >1000 m^2 • Municipal buildings • Grandstands >10,000 people • Service stations • Chemical storage facilities >500 m^2
4	**Critical structures** with special post-disaster functions	• Major infrastructure facilities • Air-traffic-control installations • Designated civilian emergency centres, medical-emergency facilities, emergency-vehicle garages, fire and police stations

In the MfE Guidelines, a distinction is made between single-storey timber-framed dwellings (that are common throughout New Zealand) and other 'normal' structures (BIC 2b). A distinction is also made between 'greenfield' and 'previously developed and already subdivided' sites. Table A2.2 shows the relationship between the fault rupture Recurrence Interval (RI) Classes and BICs in greenfield and previously developed and already subdivided sites, while Table A2.3 contains fault complexity definitions (Kerr et al. 2003).

Table A2.2 Relationships between Recurrence Interval (RI) Class, average recurrence interval of surface rupture and Building Importance Category (BIC) for developed and already subdivided and greenfield sites. From Kerr et al. (2003).

RI Class	Average Recurrence Interval of Surface Rupture	BIC Limitations (Allowable Buildings)	
		Developed and Already Subdivided Sites	Greenfield Sites
I	≤2000 years	BIC 1 Temporary buildings only	BIC 1 Temporary buildings only
II	>2000 years to ≤3500 years	BIC 1 and 2a Temporary and residential timber-framed buildings only	
III	>3500 years to ≤5000 years	BIC 1, 2a and 2b Temporary, residential timber-framed and normal structures	BIC 1 and 2a Temporary and residential timber-framed buildings only
IV	>5000 years to ≤10,000 years	BIC 1, 2a, 2b and 3 Temporary, residential timber-framed, normal and important structures (but not critical post-disaster facilities)	BIC 1, 2a and 2b Temporary, residential timber-framed and normal structures
V	>10,000 years to ≤20,000 years		BIC 1, 2a, 2b and 3 Temporary, residential timber-framed, normal and important structures (but not critical post-disaster facilities)
VI	>20,000 years to ≤125,000 years	BIC 1, 2a, 2b, 3 and 4 Critical post-disaster facilities cannot be built across an active fault with a recurrence interval ≤20,000 years	

Note: Faults with average recurrence intervals >125,000 years are not considered active.

Table A2.3 Definitions of fault-complexity terms. Adapted from the MfE Guidelines (Kerr et al. 2003).

Fault Complexity	Definition
Well defined	Fault-rupture deformation is well defined and of limited geographic width (e.g. metres to tens of metres wide).
Well-defined extended	Fault-rupture deformation has been either buried or eroded over short distances but its position is tightly constrained by the presence of nearby distinct fault features.
Distributed	Fault-rupture deformation is distributed over a relatively broad, but defined, geographic width (e.g. tens to hundreds of metres wide), typically as multiple fault traces and/or folds.
Uncertain constrained	Areas where the location of fault rupture is uncertain because evidence has been either buried or eroded, but where the location of fault rupture can be constrained to a reasonable geographic extent (≤300 m).
Uncertain poorly constrained	The location of fault-rupture deformation is uncertain and cannot be constrained to lie within a zone less than 300 m wide, usually because evidence of deformation has been either buried or eroded away or the features used to define the fault's location are widely spaced and/or very broad in nature.

Based on the MfE Guidelines (Kerr et al. 2003), which take a risk-based approach formulated around life safety, the recommended resource consent category activities for greenfield and developed and already subdivided sites within RI Class I, II, III and IV FAZs for different fault complexities are provided in Tables A2.4 and A2.5, respectively.

Table A2.4 Example Resource Consent categories for greenfield sites along RI Class I–IV faults based on the MfE Guidelines (taken from Kerr et al. [2003]). Categories account for various combinations of Building Importance Category (BIC) and fault complexity. See Kerr et al. (2003) for the full list of classifications.

Example Resource Consent Categories for Different RI Class Faults					
BIC	**1**	**2a**	**2b**	**3**	**4**
Fault Complexity	**Resource Consent Category**				
RI Class I (≤2000 years)					
Well defined	Permitted	*Non-Complying*	*Non-Complying*	*Non-Complying*	Prohibited
Distributed	Permitted	*Discretionary*	*Non-Complying*	*Non-Complying*	Non-Complying
Uncertain	Permitted	*Discretionary*	*Non-Complying*	*Non-Complying*	Non-Complying
RI Class II (>2000 to ≤3500 years)					
Well defined	Permitted	*Non-Complying*	*Non-Complying*	*Non-Complying*	Prohibited
Distributed	Permitted	*Discretionary*	*Non-Complying*	*Non-Complying*	Non-Complying
Uncertain	Permitted	*Discretionary*	*Non-Complying*	*Non-Complying*	Non-Complying
RI Class III (>3500 to ≤5000 years)					
Well defined	Permitted	Permitted*	*Non-Complying*	*Non-Complying*	Non-Complying
Distributed	Permitted	Permitted	*Discretionary*	*Discretionary*	Non-Complying
Uncertain	Permitted	Permitted	*Discretionary*	*Discretionary*	Non-Complying
RI Class IV (>5000 to ≤10,000 years)					
Well defined	Permitted	Permitted*	Permitted*	*Non-Complying*	Non-Complying
Distributed	Permitted	Permitted	Permitted	*Discretionary*	Non-Complying
Uncertain	Permitted	Permitted	Permitted	*Discretionary*	Non-Complying

Notes

* Indicates that the Resource Consent Category is permitted but could be Controlled or Discretionary given that the fault location is well defined.

Italics: The use of italics indicates that the Resource Consent Category activity status of these categories is more flexible. For example, where Discretionary is indicated, Controlled may be considered more suitable by the Council, or vice versa.

Table A2.5 Example Resource Consent categories for developed and already subdivided sites along RI Class I–IV faults based on the MfE Guidelines (taken from Kerr et al. [2003]). Categories account for various combinations of Building Importance Category (BIC) and fault complexity. See Kerr et al. (2003) for the full list of classifications.

Example Resource Consent Categories for Different RI Class Faults					
BIC	**1**	**2a**	**2b**	**3**	**4**
Fault Complexity	**Resource Consent Category**				
RI Class I (≤2000 years)					
Well defined	Permitted	*Non-Complying*	*Non-Complying*	*Non-Complying*	Non-Complying
Distributed	Permitted	*Discretionary*	*Non-Complying*	*Non-Complying*	Non-Complying
Uncertain	Permitted	*Discretionary*	*Non-Complying*	*Non-Complying*	Non-Complying
RI Class II (>2000 to ≤3500 years)					
Well defined	Permitted	Permitted*	*Non-Complying*	*Non-Complying*	Non-Complying
Distributed	Permitted	Permitted	*Discretionary*	*Non-Complying*	Non-Complying
Uncertain	Permitted	Permitted	*Discretionary*	*Non-Complying*	Non-Complying
RI Class III (>3500 to ≤5000 years)					
Well defined	Permitted	Permitted*	Permitted*	*Non-Complying*	Non-Complying
Distributed	Permitted	Permitted	Permitted	*Discretionary*	Non-Complying
Uncertain	Permitted	Permitted	Permitted	*Discretionary*	Non-Complying
RI Class IV (>5000 to ≤10,000 years)					
Well defined	Permitted	Permitted*	Permitted*	Permitted*	Non-Complying
Distributed	Permitted	Permitted	Permitted	Permitted	Non-Complying
Uncertain	Permitted	Permitted	Permitted	Permitted	Non-Complying

Notes

* Indicates that the Resource Consent Category is permitted but could be Controlled or Discretionary given that the fault location is well defined.

Italics: The use of italics indicates that the Resource Consent Category activity status of these categories is more flexible. For example, where Discretionary is indicated, Controlled may be considered more suitable by the Council, or vice versa.