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# How to Stop Building in Natural Hazard Areas

Whangarei District Council



**water**  
NEW ZEALAND  
CONFERENCE & EXPO  
17-19 OCTOBER 2023  
Tākina, Te Whanganui-a-Tara Wellington

# April 1938 – Esk Valley – and in February 2023



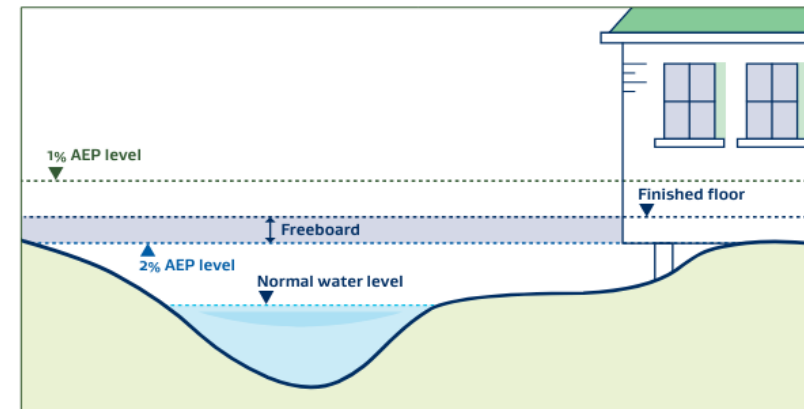
The aftermath of flooding in the Esk Valley in April 1938, when up to 3m of silt covered the area. Photo / Hawke's Bay Museums Trust



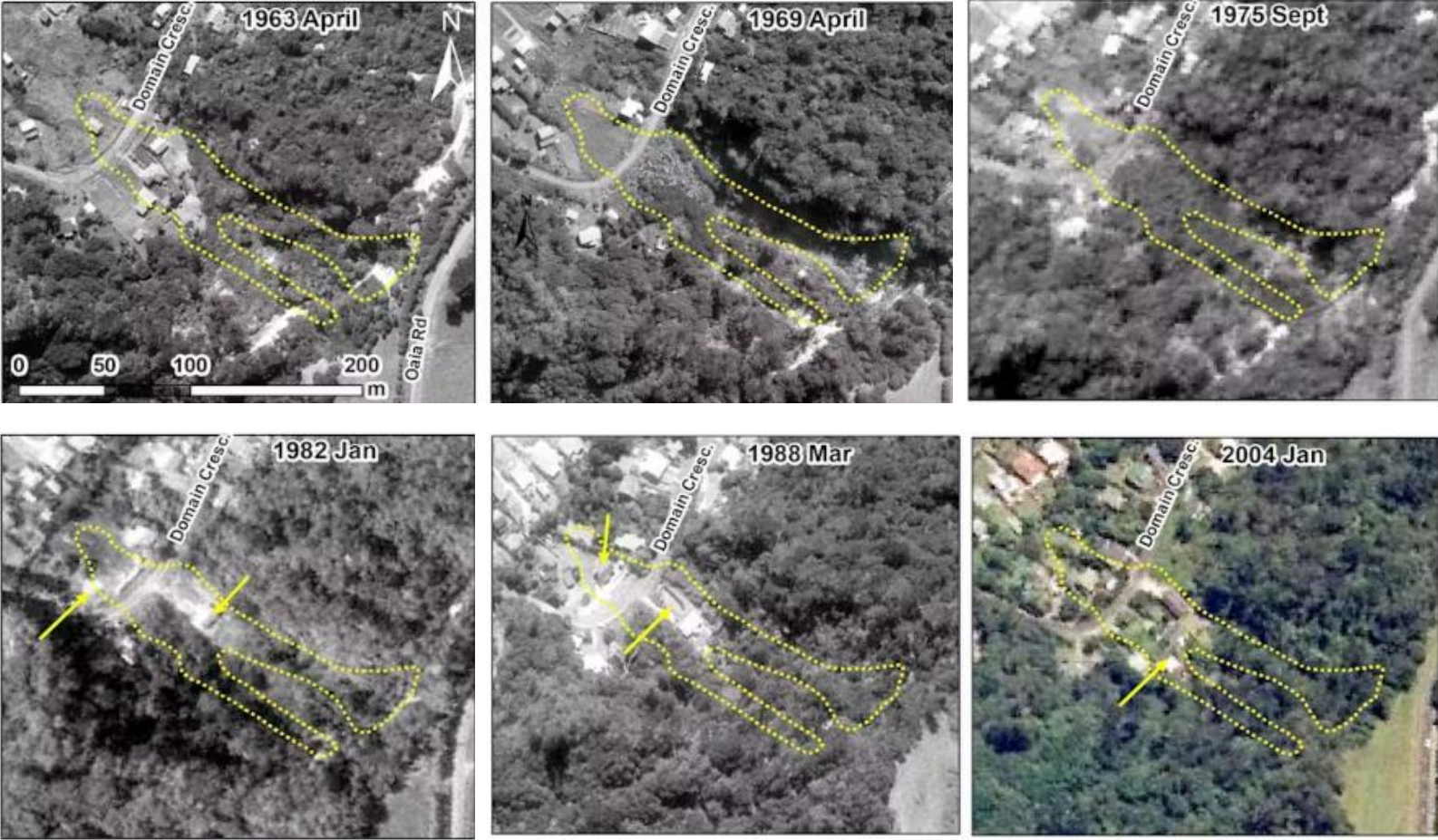
Michael Fowler says that based on the photos and information he had seen from Esk Valley after Cyclone Gabrielle, this flooding was worse than in 1938. Photo / Warren Buckland.

# Current Context

- We are not learning from the past
- Extensive development in natural hazard areas - liability
- Lack of national guidance – no consistent approach
  - Liquefaction Guidance
  - Guidance on Building Act Natural Hazard Provisions
  - Proposed NPS – Natural Hazard Decision-Making (RMA only)
  - Some national datasets such as [geonet.org.nz](http://geonet.org.nz)
- Insurance industry and lenders are responding
- Natural hazards not taken seriously by environment court, planners, building consent authorities
- Heavy reliance on local authorities
- Attitudes have changed since severe weather events in 2023
- Window of opportunity for change



# Duty of Care & Long-Term Liability



This figure shows the extent of the 1965 landslide and where new homes were built two decades later. Author provided



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Source: <https://theconversation.com/landslides-and-law-cyclone-gabrielle-raises-serious-questions-about-where-weve-been-allowed-to-build-200250>

# August 2021

## West Auckland flooding: Incredible photos as Kumeū experiences second wettest day on record



NZ Herald

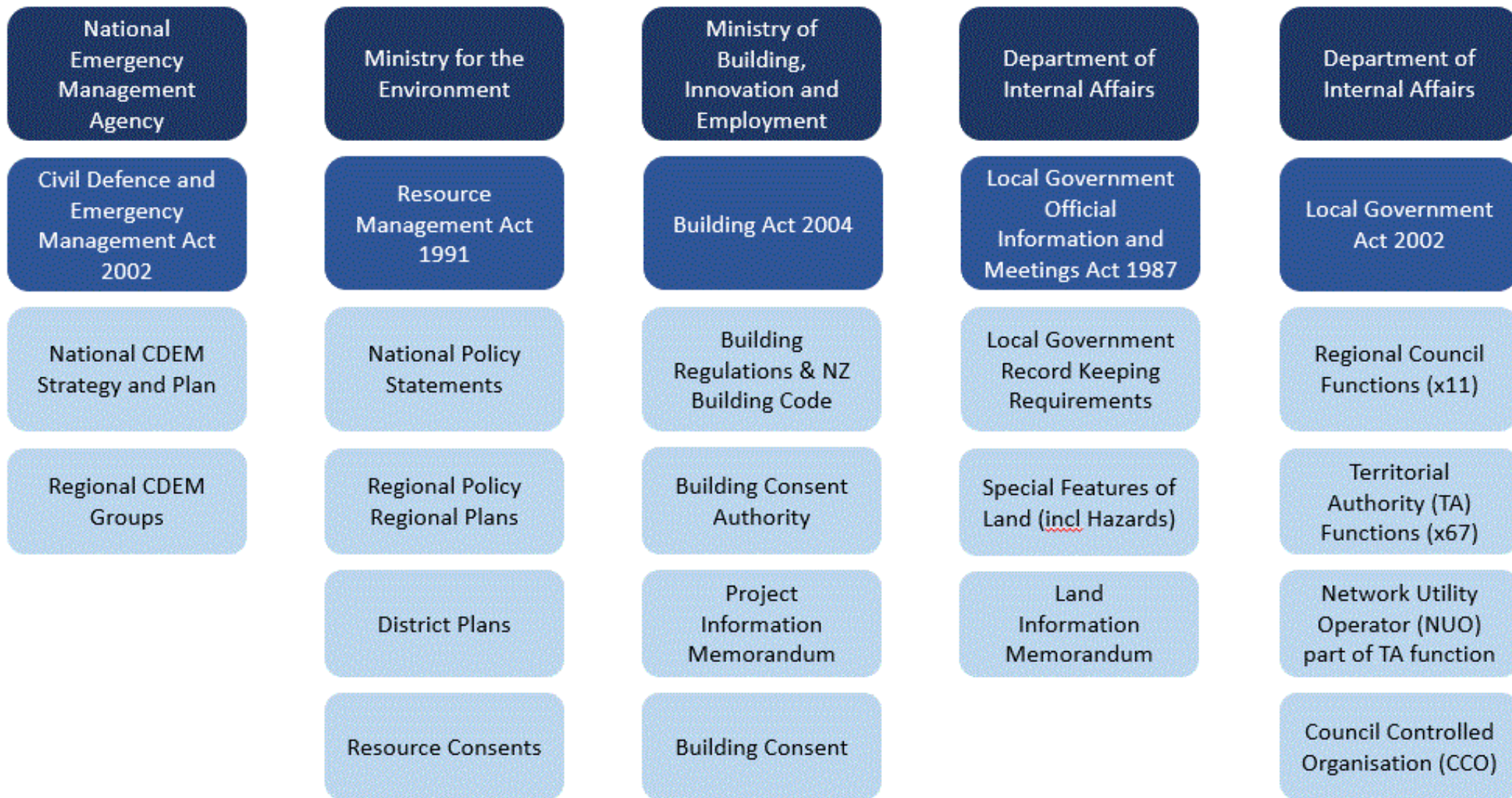
31 Aug, 2021 11:12 AM 3 mins to read

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Flooding at Kumeū in West Auckland. Photo / Brett Phibbs



Created by Shelley Wharton (adapted from the Planning and Engineering Guidance for Potentially Liquefaction-prone Land, MBIE, 2017)

# August 2022

## Insurer IAG calls for an end to building homes in flood zones

Rob Stock

August 18, 2022, - 05:00am

88 Comments



The flooded Maitai River in Nelson enters houses in Avon Terrace, Nelson.

# Underlying Principles

- Identify natural hazards at national, regional, and local levels
- Record and share hazard information to allow people to plan accordingly
- Zone land as appropriate to the hazards and risks
- Use all tools available to:
  - Protect natural systems and their hazard management function
  - Keep development away from known hazard areas
- Ability to decline consents in hazard areas if risks would increase
- Ability to approve consents in hazard areas only if safe, and to shift liability to the property owner for any resulting damage



# January 2023 – Auckland Anniversary Weekend



Hanging on the edge - landslides threaten homes on Colwill Road, Massey. Photo / Brett Phibbs

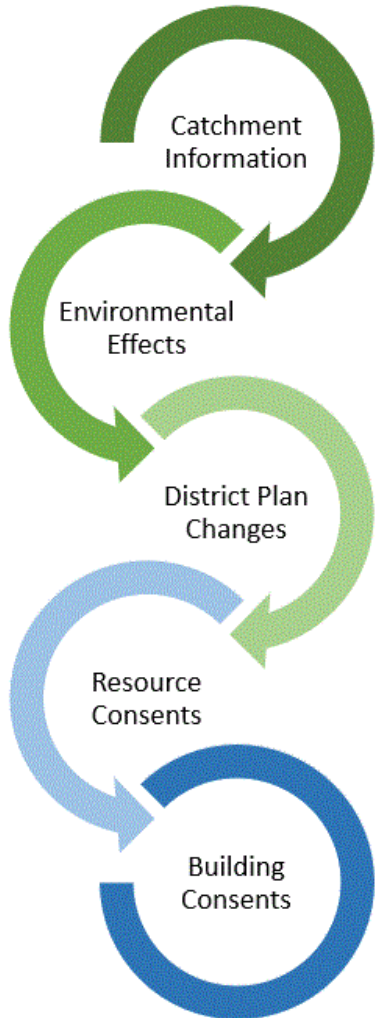
Source: <https://www.1news.co.nz/2024/01/27/auckland-anniversary-floods-timeline-the-day-the-city-was-swamped-by-rain//>

Source: <https://www.nzherald.co.nz/nz/auckland-floods-interactive-map-how-hard-was-your-suburb-hit/OZZ3SVMVFJENBES7C2X2ANQFME/>



A man and child wade through floodwaters in Auckland (Source: 1News)

# Hierarchy and Intent



Experts provide geotechnical & catchment analysis, land use analysis, known issues, & hazard management solutions (including nature-based)

Interpret into effects-based hierarchy 'Avoid – Remedy – Mitigate', actual and potential effects, and specify cumulative effects thresholds.

Provide expert evidence from people who can defend the solutions and the need to manage effects in non-technical and RMA terms.

Provide expert assessments from people who can explain the technical and adverse effects in RMA terms, and write conditions of consent.

Provide competent BC processors, include NUO's outfall / connection and catchment requirements through to implementation on-site.



Source: <https://www.testdevlab.com/blog/how-implementing-chaos-engineering-can-benefit-your-project>



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# Natural Hazard Definitions in Legislation

Natural Hazard	Legislation
Earthquake	RMA91, LGA02, CDEMA02
Tsunami	RMA91, LGA02, CDEMA02
Volcanic and Geothermal Activity	RMA91, LGA02
Eruption	CDEMA02
Wind	RMA91, LGA02
Storm, Tornado, Cyclone	CDEMA02
Drought	RMA91, LGA02
Fire	RMA91, LGA02, CDEMA02
Landslip, Subsidence	RMA91, LGA02
Slippage, Falling Debris (including soil, rock, snow, ice)	BA04
Land Movement	CDEMA02
Slippage, Subsidence, Falling Debris	LGOIMA87
Liquefaction (MBIE advised TA's to assess liquefaction as a hazard in 2019)	
Erosion, Sedimentation	RMA91, LGA02
Erosion (including coastal, bank, sheet erosion)	BA04
Land Movement	CDEMA02
Erosion, Alluvion	LGOIMA87
Flooding (and the wider context of any atmospheric or earth or water related occurrence)	RMA91, LGA02
Inundation (including flooding, overland flow, storm surge, tidal effects, and ponding)	BA04
Flood, Storm, Tornado, Cyclone	CDEMA02
Inundation, Avulsion	LGOIMA87

# February 2023 – Muriwai



One of the land slips which prompted evacuations and red or yellow stickered homes at Muriwai on Auckland's west coast earlier this year. Photo / RNZ

# February 2023 – Napier, Hastings



Extensive flooding at Awatoto seen from above the Napier Golf Course. Photo / Photography by Corena



Migrant workers from Tonga, forced onto the roofs of their flooded accommodation in Hastings [Photo: Lie Tu'imoala]

Source: <https://www.wsws.org/en/articles/2023/02/15/pamb-f15.html>

Source: <https://www.nzherald.co.nz/nz/cyclone-gabrielle-live-updates-government-provides-update-on-national-state-of-emergency-as-northland-auckland-coromandel-bay-of-plenty-hawkes-bay-and-rest-of-north-island-hit-hard/NGAOXTW3ZRG5G5GKWIY6OTF23AE/>

# The Roadmap to Integrated Natural Hazard Management

# Legislation Analysis – Natural Hazards

- A handy reference guide to the interconnectedness and relevant bits of:
  - Resource Management Act
    - Purpose of the Act, Matters of national importance, esplanade reserves, refusal of subdivision, protection of *other property*
  - Local Government Act
    - Regional and district functions, Bylaws, Network Utility Operator
  - Local Government Official Information and Meetings Act
    - Special features or characteristics of the land (ie natural hazards), LIMs and PIMs
  - Civil Defense Emergency Management Act
    - Regional CDEM Groups, risk reduction, compliance and monitoring requirements
  - Building Act
    - Purpose of the Act, PIMs, s71 refusal of consent, transfer of long-term liability
  - NZ Building Code Clause E1 Surface Water
    - Objectives, performance, scope & limitations where Network Utility Operator information takes precedence, competency to assess, primary and secondary flows

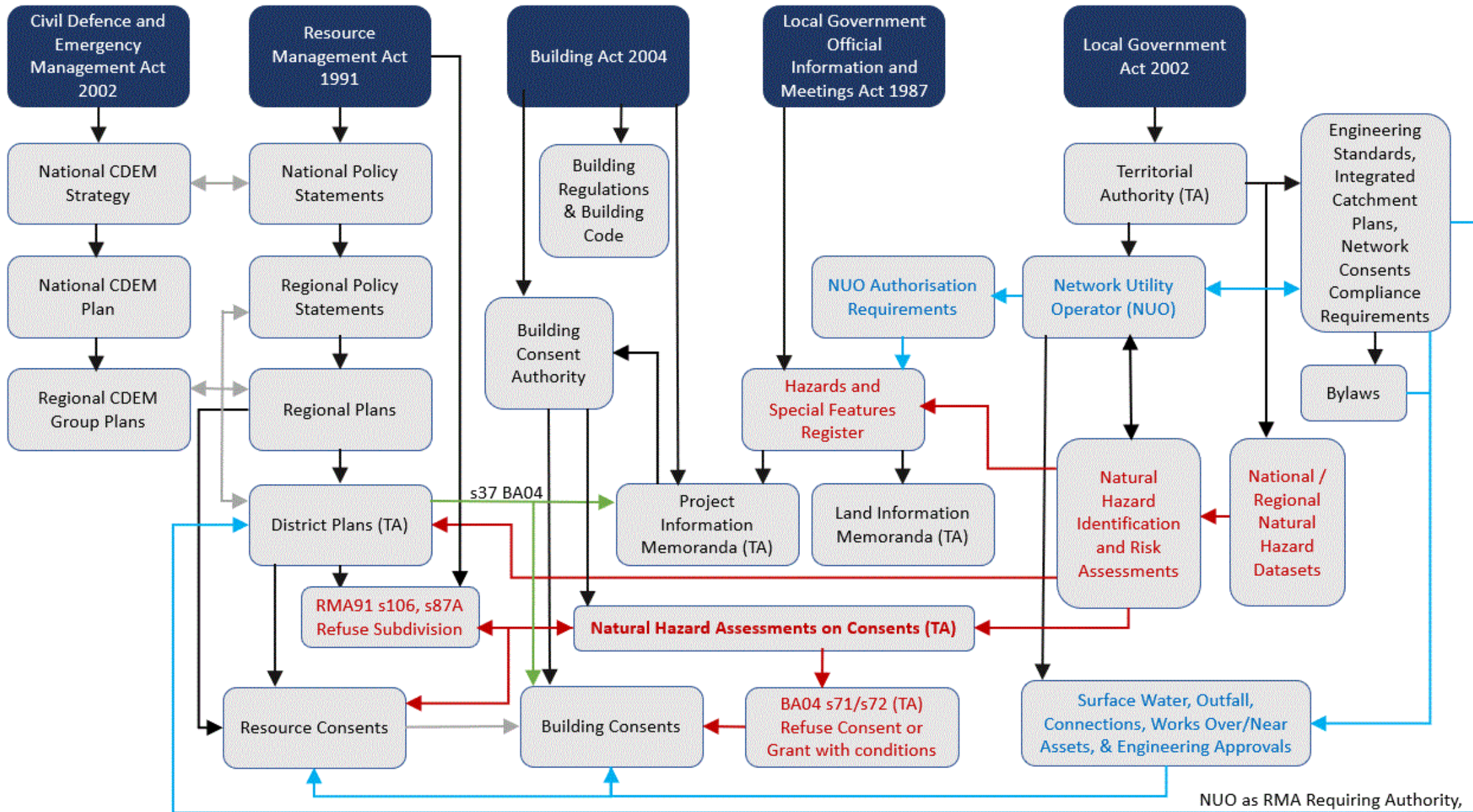


# February 2023 – Esk Valley



A vineyard in Esk Valley, part of Hawkes Bay, lies buried under tons of mud after Cyclone Gabrielle flooded the area. (Bruce Jenkins/Cephas)

# Natural Hazards Legislative Framework



Created by Shelley Wharton (adapted from the Planning and Engineering Guidance for Potentially Liquefaction-prone Land, MBIE, 2017)

NUO as RMA Requiring Authority, authoriser, and catchment expert

# Role of the Network Utility Operator (NUO)

- Stormwater NUO connects across the legislation
- Engineering standards, surface water management, outfall authorisations
- NUO requirements can override NZBC Clause E1 Surface Water
- Requiring authority under the RMA
- Additional requirements under the Public Health Act
- Able to use bylaws for regulatory compliance - primary and secondary networks
- Key roles in civil defence
- Catchment plans are a good tool for integrated natural hazard management
- It is not enough to solely rely on GIS maps!

# January 2024

1415 new homes consented on Auckland flood plains in the year since flooding disaster

Housing



Natural Hazard	Competency	Assessment Required
Landslip, Subsidence, Liquefaction, Alluvion, Sedimentation, Erosion (including coastal, bank, sheet erosion)	Combined competency of Geotechnical Engineer, Hydrogeologist, Stormwater Engineer, Catchment Hydrologist, Coastal Processes Expert	Combined geotechnical conditions and stability predictions, with network and hydrological assessments considering erosion, sedimentation, alluvion, liquefaction and overall land stability. Include current and future predictions as a result of development and imperviousness changing surface water flows, concentrating flows, increasing runoff volumes, reducing infiltration, adding outfall locations, and on-site disposal. Include cumulative effects.
Inundation (including flooding, overland flow, storm surge, tidal effects, and ponding)  Avulsion (meaning sudden cutting off of land by flood, currents, or change in course of a body of water)	Combined competency of Stormwater Engineer, Catchment Hydrologist, Coastal Processes Expert	Hydrological modelling of surface water for catchments with 100 year ARI over 0.3m <sup>3</sup> /s (~1 hectare): <ul style="list-style-type: none"> <li>• 2 year ARI frequent concentrated flows (ie not sheet flow)</li> <li>• 10 year ARI primary networks</li> <li>• 50 year ARI secondary overland flows</li> <li>• 100 year ARI secondary overland flows and floodplains of streams/ivers</li> <li>• 100 year ARI ponding areas</li> </ul> <p>Use rainfall intensity at a regional or local scale and to accommodate future predictions including storm surge, tidal effects, and sea level rise as it impacts flooding levels in lower catchments.</p> <p>Use LIDAR and/or on-site survey depending on accuracy needed.</p>
Esplanade reserve requirement, determination of river bed width in relation to esplanade function in natural hazard management	Stormwater Engineer, Catchment Hydrologist	Undertake hydrological modelling to determine the extent of the <i>mean annual flood (MAF)</i> of average recurrence interval ARI 2.3 years ( <i>Stumbles et al, 2008</i> ) to identify those waterways with an average river bed width of 3.0 metres or greater.  Map the MAF extent and set the total esplanade reserve width from the stream to 20 metres beyond the MAF in the District Plan.

# Assessing Natural Hazards

# Communication of Risks

Example: Risk-Based Natural Hazard Management - Residential Development				
Risk Profile	Zone	RMA91	BA04	Natural Hazard Inundation (Flooding)
Significant risk (Intolerable)	Red	Avoid, Prohibited activity, s106 refuse subdivision	S71 Refuse building consent	10 year ARI event
High risk (Intolerable)	Red	Avoid, Prohibited or Non-complying activity	S71 Refuse building consent	50 year ARI event (2% AEP event)
Moderate risk (more than low risk but not intolerable)	Orange	Remedy or Mitigate, Discretionary activity	S71 refuse BC or s72 grant BC for siteworks only in hazard area (not a building)	100 year ARI (high velocity, large debris load, depth >200mm), potential impact to other property
Low risk (generally acceptable risk)	Yellow	Allow, Restricted Discretionary or Controlled activity	Likely S72 grant BC for siteworks only in hazard area (not a building)	100 year ARI (low velocity, minimal debris load, depth <200mm), no impact to other property

- Consistent terminology assists public understanding
- NPS-NHD risk language
- Alignment with RMA Effects-based planning
  - Avoid, Remedy, Mitigate
  - Actual, potential, cumulative effects

# February 2024

## Eskdale residents still 'fighting with insurance companies' since cyclone damage

7:41 pm on 21 February 2024

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 **Kate Green**, Journalist  
✉ [kate.green@rnz.co.nz](mailto:kate.green@rnz.co.nz)



The aftermath of massive flooding that swept through the Esk Valley during Cyclone Gabrielle. T Photo: RNZ/ Sally Murphy

## Cyclone Gabrielle: Hawke's Bay homeowners outraged at proposal they pay council back for demolition costs

4:36 pm on 1 February 2024

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 **Lauren Crimp**, Reporter  
✉ [lauren.crimp@rnz.co.nz](mailto:lauren.crimp@rnz.co.nz)



Esk Valley on 20 February following Cyclone Gabrielle. Photo: RNZ/ Nick Monro

Source: <https://www.rnz.co.nz/news/national/509798/eskdale-residents-still-fighting-with-insurance-companies-since-cyclone-damage>

Source: <https://www.rnz.co.nz/news/national/508158/cyclone-gabrielle-hawke-s-bay-homeowners-outraged-at-proposal-they-pay-council-back-for-demolition-costs>

# Conclusions

## Legislation

- simplify the system, decouple from RMA process

## Policy & Guidance

- national guidance work needs to continue, clarify roles

## Resourcing

- reduce the burden on local authorities, or resource the work adequately

## Implementation

- focus on the simple control points first, use what we have

## Working Together

- Stormwater and geotechnical engineers, hydrologists need to work together

## Communicating Hazard Risk

- Align to definitions, consistency, increase public understanding



# It is time to change



**Thank you**

**He Pātai?  
Questions?**