[redacted]

Ref: OIA-2024/25-0574

Dear [redacted]

Official Information Act request for further information on catastrophic earthquake planning

Thank you for your Official Information Act request received on 15 January 2025. You requested:

> *"I would like to make a further OIA request for:*
>
> 1. *Any further documents prepared by or for the Crown as to the consequences of a catastrophic earthquake in the future (such as documents relating to police and military implications, financial and economic implications, international relations implications)*
> 2. *Any further documents prepared by or for the Crown as to Crown plans to respond to a catastrophic earthquake in the future."*

On 13 February 2025, we extended the time frame for responding to your request under section 15A of the Act by 22 working days to allow time to complete consultations needed before a decision could be made on the request. Following this extension, I am now in a position to respond.

Timeframe for request

Your request is a follow-up to a request for information from the National Emergency Management Agency (NEMA) session on 'catastrophic risk' at the May 2024 disaster risk, resilience and recovery science at a conference run by the Resilience to Nature Challenge.

We have taken the timeframe of this request to be for relevant information about catastrophic earthquake planning to be from 6 October 2022. We have defined this timeframe because the 6 October 2022 was when the NEMA Chief Executive first commissioned work on catastrophic earthquakes, and the term "catastrophic" was defined by NEMA.

Interpretation of scope of request

Your request refers to 'documents prepared for or by the Crown'. NEMA and the Department of the Prime Minister and Cabinet (DPMC) can only respond to their request as it relates to information produced by NEMA and/or DPMC. If you are seeking information that you believe may be held by another agency, you may wish to consider making a request direct to that agency (if you have not done so already). Details on other government agencies are available on the government website: www.govt.nz. Te Kawa Mataaho Public Service Commission also provides a list of central government organisations at: www.publicservice.govt.nz/system/central-government-organisations.

Executive Wing, Parliament Buildings, Wellington, New Zealand 6011
☎ 64 4 817 9698 www.dpmc.govt.nz

We have interpreted your request to be for formal documents produced by NEMA or DPMC on the consequences of a catastrophic earthquake and the plans to respond to a catastrophic earthquake in the future.

Information released

Please find attached the following documents, as set out in the table below:

Item	Date	Subject and Document Title	Decision
Item 1	9/03/2023	[*Cabinet Committee paper and related Minutes*]. Alternative National Crisis Management Centre: Report Back on Continuity of Government Arrangements, [GOV-23-SUB-0001]	Release. Some information is marked as not in scope. [*Please note context given below*].
Item 2	10/07/2024	**Exercise Rū Whenua** Presentation on Ru Whenua AF8 Macro Scenario	Release [*Please note the context for these slides given below*].
	12/06/2024	**Exercise Rū Whenua** Day one presentation: modelled information and science update	
	26/06/2024	**Exercise Rū Whenua** Day two presentation: scenario	
	10/07/2024	**Exercise Rū Whenua** Day three presentation: a recovery scenario	
Item 3	19/10/2022	Catastrophic event readiness papers submitted to the Hazard Risk Board (HRB) and Security and Intelligence Board (SIB) meetings on: • 19 October 2022 • 8 December 2022 • 11 May 2023	Release with some contact information withheld under: s9(2)(a) Some information is marked as not in scope.
Item 4		Relevant Hazard Risk Board (HRB) and Security and Intelligence Board (SIB) Minutes for meetings held on: • 19 October 2022 • 8 December 2022 • 11 May 2023	Release relevant parts. Some information is marked as not in scope. [*Please note context below*]

As noted in the table above, some information has been withheld under section 9(2)(a) of the Act, to protect the privacy of individuals.

Some parts not relevant to your request have been marked accordingly with "Not in Scope".

Context for Item 1 – Cabinet Paper and Minutes

In the 9 March 2023 Cabinet Paper "*Alternative National Crisis Management Centre: Report Back on Continuity of Government Arrangements*, [GOV-23-SUB-0001]" there is reference to

a 2014 emergency relocation plan. Although it met a need at the time, it should be noted that this plan is no longer current.

A first version of the plan has been completed as noted in recommendations 7, 8, and 9 that puts in place a framework for a response if Wellington is impacted by a catastrophic event. This plan focuses on Wellington being impacted, with a response being stood up outside of Wellington, primarily in Auckland. DPMC is working in partnership with the Department of Internal Affairs (DIA), as co-leads. It is an interagency plan that has been worked on with a collective of agencies responsible for delivering the "business as usual" functions of Executive Government. The continuity of Parliament Plan is held by the Parliamentary Service. Work continues across agencies to strengthen the foundations of the plan and address enduring challenges to ensure successful implementation when required.

Context for Item 2 – Exercise Rū Whenua

Item 2 consists of slides used for an exercise helping to plan for a catastrophic earthquake. It should be noted that the 'Alpine Fault M8.2 Exercise Ru Whenua scenario' was developed for the specific application of a Tier 4 (national) exercise. This scenario has not been written up in a full scientific report nor a plain language document, rather was delivered as a PowerPoint for easy communication and sharing. It can be considered unique but draws heavily from the previous Alpine Fault hazard and impact scenario, developed for the SAFER (South Island Alpine Fault Earthquake Response) Framework: af8.org.nz/media/tmkaaiwe/af8-safer-framework-2018-lr.pdf.

We respectfully note and caution that this slide pack is intended to be presented by a natural hazard risk expert, rather than be a standalone, public-facing document. The intent is that the risk expert presenter can present the material with the appropriate context, applications, and limitations. For example, the slide pack does not include many of the input assumptions or various other assumptions used in the development of the models, the limitations of the models and the results, nor does it contextualise this risk.

Given the context above, please be mindful that it is (potentially) easy to misinterpret or misrepresent these results, even for someone relatively literate in natural hazard risk science. The slides are a prop for the expert presenter to use to communicate the full content of the scenario. Finally – this is only a scenario, and a future event will almost certainly be different, but the planning and preparedness we undertake now for a scenario of this scale and complexity will be invaluable and essential for preparing Aotearoa New Zealand for any catastrophic event.

Context for Item 4 – Minutes from relevant Hazard Risk Board (HRB) and Security and Intelligence Board (SIB) meetings

Please note that the minutes held have not been formally finalised, they retain "Draft" watermark and are not the finally agreed version of the minutes. In particular, please note that draft Minutes of the meeting held on 8 December 2022 has suggested edits marked up, that were never finalised.

Publicly available information

The following information set out in the table below has been identified as relevant to your request and is already or soon to be made publicly available.

Date	Document Title	Website Address
Dec 2024	Catastrophic Event Handbook	www.civildefence.govt.nz/resources/news-and-events/news-and-events/catastrophic-event-handbook-released
Dec 2018	Wellington Earthquake National Initial Response Plan	www.civildefence.govt.nz/cdem-sector/guidelines/wellington-earthquake-national-initial-response-plan
	[GNS seismic information commissioned by DPMC to be published shortly on the NEMA website]	To be published at: www.civildefence.govt.nz/resources/publications

Accordingly, I have refused your request for the documents listed in the above table under section 18(d) of the Act – the information requested is or will soon be publicly available.

Information withheld in full

Also identified as relevant to your request are some briefings provided by the Department of the Prime Minister and Cabinet's Policy Advisory Group to the Prime Minister. These briefings are provided to the Prime Minister in confidence to support him in his role as leader of the Government and chair of Cabinet. These briefings are withheld in their entirety under the following sections of the Act:

- section 9(2)(f)(iv), to maintain the confidentiality of advice tendered by or to Ministers and officials
- section 9(2)(g)(i), to maintain the effective conduct of public affairs through the free and frank expression of opinion.

Where section 9 of the Act applies, in making my decision, I have considered the public interest considerations in section 9(1) of the Act. No public interest has been identified that would be sufficient to outweigh the reasons for withholding that information.

You have the right to ask the Ombudsman to investigate and review my decision under section 28(3) of the Act.

This response will be published on the Department of the Prime Minister and Cabinet's website during our regular publication cycle. Typically, information is released monthly, or as otherwise determined. Your personal information including name and contact details will be removed for publication.

Yours sincerely

Sean Bolton
Executive Director
Risk and Systems Governance Group

~~IN CONFIDENCE~~ UNCLASSIFIED

Office of the Minister for Emergency Management

Cabinet Government Administration and Expenditure Review Committee

Alternative National Crisis Management Centre: report back on continuity of government arrangements

Proposal

1 This paper provides an update on two initiatives to enable continuity of government following an event that significantly disrupts Wellington.

1.1 Development of a contingent emergency management workforce.

1.2 A review of the plan for the Emergency Relocation of Executive Government and Parliament (the Emergency Relocation Plan).

Relation to government priorities

2 Workforce development and the Emergency Relocation Plan review support the Cabinet Priorities Committee's directive to develop an urgent business case for an alternative National Crisis Management Centre (NCMC) [CPC-21-MIN-0032].

Background

3 Cyclone Gabrielle has had significant impacts across the North Island and lessons learned after all activations inform future ways of operating.

4 Wellington along with a number of regions face the risk of even more significant impacts from multiple seismic hazards, including the Alpine Fault, the Wellington Fault, and the Hikurangi Subduction Zone. The city's coastal position also places it at risk from large tsunami, from both local and distant sources.

5 The rapid mobilisation of an effective NCMC is critical to central government's coordination of a major crisis. However, a seismic or tsunami event that significantly affects Wellington could render the primary NCMC facility inoperable and would reduce the ability of Wellington-based staff to respond.

6 The current arrangements for an alternative NCMC – a 'cold start' facility at Ellerslie Racecourse in Auckland – are not fit for purpose. In December 2021, the Cabinet Priorities Committee directed the National Emergency Management Agency (NEMA) to develop an urgent business case for an alternative NCMC facility outside Wellington [CPC-21-MIN-0032].

7 The indicative business case identified a gap in the number of trained staff outside Wellington who could step in to operate an alternative facility. In August 2022, Cabinet [CAB-22-MIN-0342]:

7.1 endorsed the indicative business case and directed NEMA to commence a detailed business case for an alternative NCMC facility;

7.2 agreed to fund the commencement of the detailed business case for an alternative NCMC and initial workforce development with $2.6 million from the between-Budget contingency established through Budget 2022;

7.3 invited the Minister for Emergency Management to report back to Cabinet by 31 December 2022 with an update on NEMA's workforce planning and review of the existing Emergency Relocation Plan.

Workforce development and updates to the Emergency Relocation Plan will be informed by broader planning around a catastrophic event scenario

8 In mid-November 2022, NEMA convened a multi-agency group to plan for a catastrophic event affecting New Zealand, based on the 'maximum credible scenario' of a major Hikurangi Subduction Zone earthquake and resulting tsunami. This planning activity is intended to confirm agencies' responsibilities in response and consider how they could be delivered in practice.

9 The challenges and constraints identified through catastrophic event planning will be valuable for informing the alternative NCMC business case (including workforce matters). I also consider that it would be desirable to align future updates to the Emergency Relocation Plan with relevant aspects of NEMA's catastrophic event scenario and planning.

Developing a contingent workforce to support the alternative NCMC

The alternative NCMC requires a significant number of staff, on top of central government agencies' other critical responsibilities during a response

10 Workforce modelling suggests that more than 600 people (across three shifts) would be required to effectively staff the alternative NCMC for a large 24-hour response. This workforce is in addition to the staffing required by regional Civil Defence Emergency Management groups and central government agencies' business continuity plans. The alternative NCMC workforce estimate will be refined as the business case is finalised.

11 NEMA has engaged with 44 central government agencies since September 2022 to discuss their potential workforce available in Auckland. Approximately 350 staff have been identified to date.

12 Agencies' business continuity plans identify the critical 'business as usual' services that must continue to operate in the same situations that would require the activation of the alternative NCMC, and the services they must provide to the response. These responsibilities are extensive for many agencies – so far, only two agencies could each contribute more than 50 staff to the Auckland alternative NCMC workforce.

NEMA is investigating other potential sources for a contingent workforce

13 Given their other critical responsibilities during a response, it is highly unlikely that central government agencies alone could provide all the staff required for a contingent workforce. However, NEMA is working with the Mobility Hub at Te Kawa Mataaho to find resources from across the public service.

14 NEMA is broadening its engagement to include the wider public sector and has started to investigate other potential workforce sources. Options being explored include Auckland University, private business and developing a cohort of 'emergency management reservists'.

Training will initially focus on incident leadership roles

15 In parallel with its efforts to secure an alternative NCMC workforce, NEMA is developing a suite of training, assessment and exercise material.

16 The alternative NCMC workforce model is broken into five tiers, prioritising (in order of responsibility and experience) the identification and training of:

16.1 **Tier 1: incident leadership** – staff trained and exercised to fill leadership roles within an incident management team.

16.2 **Tier 2: trainers** – staff trained and exercised to provide 'just in time' training on the Coordinated Incident Management System (CIMS).[1]

16.3 **Tier 3: function team members** – staff trained and exercised to fulfil a CIMS function within an incident management team.

16.4 **Tier 4: subject matter experts** – specialists and technical experts who require a basic knowledge of CIMS to provide an advisory role.

16.5 **Tier 5: support staff** – other staff who need to understand how the alternative NCMC works (such as IT and security staff).

17 Basic training and exercising for the alternative NCMC workforce will begin in March 2023. Training packages for Operations, Intelligence, Planning and Logistics CIMS functions will be available to Tiers 2 to 3 by 30 June 2023. Leadership (Tier 1) training will begin by August 2023. This will enable an initial alternative NCMC exercise to take place towards the end of 2023. A new continuous professional development programme (also released by 30 June 2023) will help ensure that workforce capability can be maintained.

[1] CIMS is New Zealand's framework for ensuring coordinated incident management between agencies through a common set of response functions: Controller, Intelligence, Logistics, Operations, Public Information Management, Planning, Safety, and Welfare.

Review of the Emergency Relocation Plan

The Emergency Relocation Plan is based on several out-of-date assumptions

18 The Emergency Relocation Plan has not been updated since it was developed in 2014. It focuses on the tasks required to relocate Ministers, Members of Parliament and essential staff to an emergency parliamentary facility at Devonport Naval Base, in order to achieve a sitting of the House within seven days of a declared or extended state of national emergency.[2]

19 The Office of the Clerk and Parliamentary Service have reviewed the current Emergency Relocation Plan and concluded that it should be updated to reflect an up-to-date understanding of hazards and risks:

19.1 Updated risk modelling indicates that Devonport Naval Base is in an orange tsunami evacuation zone.

19.2 The plan may rely on too many dependencies (such as availability of transport and shared response resources) to be workable in practice.

19.3 The plan assumes that the NCMC will operate from its primary location in the Beehive sub-basement.

19.4 There is an opportunity to incorporate lessons from COVID-19, such as virtual or hybrid House sittings. These may be viable alternatives to full relocation depending on the status of communications infrastructure.

Refreshed planning should broaden its focus to enabling continued delivery of Executive Government and Parliament

20 The Emergency Relocat on Plan has a relatively tight focus and does not meaningfully explore alternatives to relocation.

21 I recommend that future planning should consider the overall *delivery* of Executive Government and Parliamentary business in a broader sense. This lens would provide better flexibility to address a range of emergency situations (and the resulting challenges). Specific improvements include:

21.1 developing a range of options, such as possible virtual alternatives to physical relocation;

21.2 planning across defined time horizons – the initial response (48 hours), transition to a sustained response (48 hours to 7 days), sustained response (7 to 28 days), and extended response (from 28 days);

21.3 considering other lessons learned from increased remote working (for both Executive Government and Parliament) since 2020.

[2] This is a requirement under s 67 of the *Civil Defence Emergency Management Act 2002*.

22 The agencies responsible for supporting Executive Government and Parliament[3] have begun work to address the review's findings. A new contingency plan (or plans) for continued delivery of Executive Government and Parliament will be completed in the second half of 2023 – this timing will enable alignment with the framework developed through NEMA's catastrophic event planning.

23 To progress this work, I propose that NEMA work with responsible agencies to coordinate the updated Plan for Delivery of Executive Government and Parliament and ensure individual agency plans are aligned for a coherent Plan.

Further update to be provided in a May 2023 report back

24 In August 2022, Cabinet directed NEMA to report back to the Cabinet Government Administration and Expenditure Review Committee (GOV) in early 2023 with recommendations on location for the alternative NCMC and operating model [CAB-22-MIN-0342].

25 I will provide an update on workforce development and planning for the continued delivery of Executive Government and Parliament in May 2023 as part of this report back. Financial Implications

26 There are no direct financial implications arising from this paper. Additional funding for workforce development will be considered through future Budgets as part of broader work on the alternative NCMC [CAB-22-MIN-0342].

Legislative Implications

27 There are no legislative implications arising from this paper.

Impact Analysis

Regulatory Impact Statement

28 A Regulatory Impact Statement is not required for the proposals in this paper.

Climate Implications of Policy Assessment

29 A Climate Implications of Policy Assessment is not required for the proposals in this paper.

Population Implications

30 There are no population implications arising from this paper.

[3] Parliamentary Service, Office of the Clerk, Department of the Prime Minister and Cabinet, Department of Internal Affairs, Te Kawa Mataaho Public Service Commission, and NEMA.

Human Rights

31 There are no implications for the New Zealand Bill of Rights Act 1990 or the Human Rights Act 1993.

Consultation

32 The Department of the Prime Minister and Cabinet, Department of Internal Affairs, Te Kawa Mataaho Public Service Commission, Office of the Clerk, and Parliamentary Service have been consulted on this paper.

Proactive Release

33 I intend to delay the proactive release of this paper until further decisions on the alternative NCMC business case have been made.

Recommendations

The Minister for Emergency Management recommends that the Committee:

1 note that in August 2022, Cabinet invited the Minister for Emergency Management to report back to Cabinet by 31 December 2022 with an update on NEMA's workforce planning and review of the existing parliamentary/ministerial plan [CAB-22-MIN 0342];

2 note that workforce development and a refresh of the plan for the Emergency Relocation of Executive Government and Parliament will be informed by NEMA planning on a catastrophic event scenario;

3 note that 350 of an estimated 600 contingency staff have been identified in Auckland so far, with central government agencies' other critical responsibilities during response a key constraint on availability;

4 note that NEMA is broadening its engagement to explore potential workforce sources outside the public service;

5 note that training and exercising for alternative NCMC leadership will begin in March 2023, with training for other key roles available by June 2023;

6 note that the plan for the Emergency Relocation of Executive Government and Parliament is based on several out-of-date assumptions;

7 agree the plan referenced in paragraph 6 above should be updated to broaden its focus from 'relocation' to the 'continued delivery' of Executive Government and Parliament;

8 note that the new plan will be completed in the second half of 2023, informed by NEMA's catastrophic event planning, and with input from agencies responsible for supporting the continued delivery of Executive Government and Parliament;

9 agree that NEMA will work with responsible agencies to coordinate the updated Plan for Continued Delivery of Executive Government and Parliament and ensure individual agency plans are aligned for a coherent Plan.

10 note the Minister for Emergency Management will provide an update on workforce development and planning for the continued delivery of Executive Government and Parliament in May 2023, as part of the planned report back to GOV on other alternative NCMC matters [CAB-22-MIN-0342].

Authorised for lodgement

Hon Kieran McAnulty

Minister for Emergency Management

Cabinet Government Administration and Expenditure Review Committee

Minute of Decision

Alternative National Crisis Management Centre: Report Back on Continuity of Government Arrangements

Portfolio **Emergency Management**

On 9 March 2023, the Cabinet Government Administration and Expenditure Review Committee:

1 **noted** that in August 2022, Cabinet invited the Minister for Emergency Management to report back to Cabinet by 31 December 2022 with an update on the National Emergency Management Agency's (NEMA) workforce planning and review of the existing parliamentary/ministerial plan [CAB-22-MIN-0342];

2 **noted** that workforce development and a refresh of the plan for the Emergency Relocation of Executive Government and Parliament will be informed by NEMA planning on a catastrophic event scenario;

3 **noted** that 350 of an estimated 600 contingency staff have been identified in Auckland so far, with central government agencies' other critical responsibilities during response a key constraint on availability;

4 **noted** that NEMA is broadening its engagement to explore potential workforce sources outside the public service;

5 **noted** that training and exercising for alternative National Crisis Management Centre leadership will begin in March 2023, with training for other key roles available by June 2023;

6 **noted** that the plan for the Emergency Relocation of Executive Government and Parliament is based on several out-of-date assumptions;

7 **agreed** the plan referenced in paragraph 6 above should be updated to broaden its focus from 'relocation' to the 'continued delivery' of Executive Government and Parliament;

8 **noted** that the new plan will be completed in the second half of 2023, informed by NEMA's catastrophic event planning, and with input from agencies responsible for supporting the continued delivery of Executive Government and Parliament;

9 **agreed** that NEMA will work with responsible agencies to coordinate the updated Plan for Continued Delivery of Executive Government and Parliament and ensure individual agency plans are aligned for a coherent Plan;

10 **noted** that the Minister for Emergency Management will provide an update on workforce development and planning for the continued delivery of Executive Government and Parliament in May 2023, as part of the planned report back to GOV on other alternative NCMC matters [CAB-22-MIN-0342].

Vivien Meek
Committee Secretary

Present:
Hon Grant Robertson (Chair)
Hon Jan Tinetti
Hon Andrew Little
Hon David Parker
Hon Kieran McAnulty
Hon Meka Whaitiri
Hon Dr Duncan Webb
Hon Dr Deborah Russell

Officials present from:
Office of the Prime Minister
Officials Committee for GOV

Cabinet

Minute of Decision

Report of the Cabinet Government Administration and Expenditure Review Committee: Period Ended 10 March 2023

On 13 March 2023, Cabinet made the following decisions on the work of the Cabinet Government Administration and Expenditure Review Committee for the period ended 10 March 2023:

[Not in Scope]

GOV-23-MIN-0001 **Alternative National Crisis Management Centre: Report Back on Continuity of Government Arrangements** CONFIRMED
Portfolio: Emergency Management

[Not in Scope]

Rachel Hayward
Secretary of the Cabinet

Rū Whenua
AF8 Macro Scenario

[Please note the following context for these slides for "Exercise Rū Whenua":

These slides were used for an exercise helping to plan for a catastrophic earthquake. It should be noted that the 'Alpine Fault M8.2 Exercise Rū Whenua scenario' was developed for the specific application of a Tier 4 (national) exercise. This scenario has not been written up in a full scientific report nor a plain language document, rather was delivered a powerpoint for easy communication and sharing. It can be considered unique but draws heavily from the previous Alpine Fault hazard and impact scenario, developed for the SAFER (South Island Alpine Fault Earthquake Response) Framework: af8.org.nz/media/tmkaaiwe/af8-safer-framework-2018-lr.pdf.

We respectfully note and caution that this slide pack is intended to be presented by a natural hazard risk expert, rather than be a standalone, public-facing document. The intent is that the risk expert presenter can present the material with the appropriate context, applications, and limitations. For example, the slide pack does not include many of the input assumptions or various other assumptions used in the development of the models, the limitations of the models and the results, nor does it contextualise this risk.

Given the context above, please be mindful that it is (potentially) easy to misinterpret or misrepresent these results, even for someone relatively literate in natural hazard risk science. The slides are a prop for the expert presenter to use to communicate the full content of the scenario. Finally – this is only a scenario, and a future event will almost certainly be different, but the planning and preparedness we undertake now for a scenario of this scale and complexity will be invaluable and essential for preparing Aotearoa New Zealand for any catastrophic event.]

AF8 Scenario Development Working Group

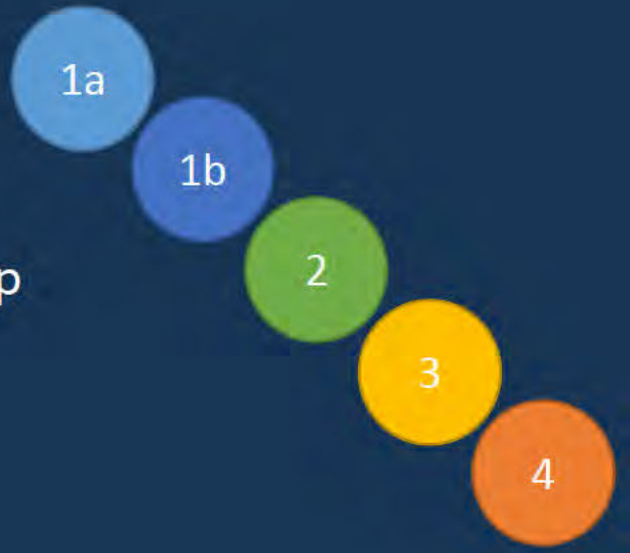
Dr Tom Robinson (Chair; UC), Alice Lake-Hammond (AF8), Prof. Tom Wilson (UC & NEMA CSA), A. Prof Caroline Orchiston (UO), Prof Liam Wotherspoon (UA), Dr Robert Langridge (GNS), Derek Baxter (NEMA), Becky Tuke (NEMA), Matthew Alley (Otago CDEM), Julia Harvey (UC)

Bespoke Science products for Rū Whenua:
Casualties - Dr Nick Horspool (GNS); Habitability - Finn Scheele (UC & GNS); Transient Populations – Mathew Darling (UC)

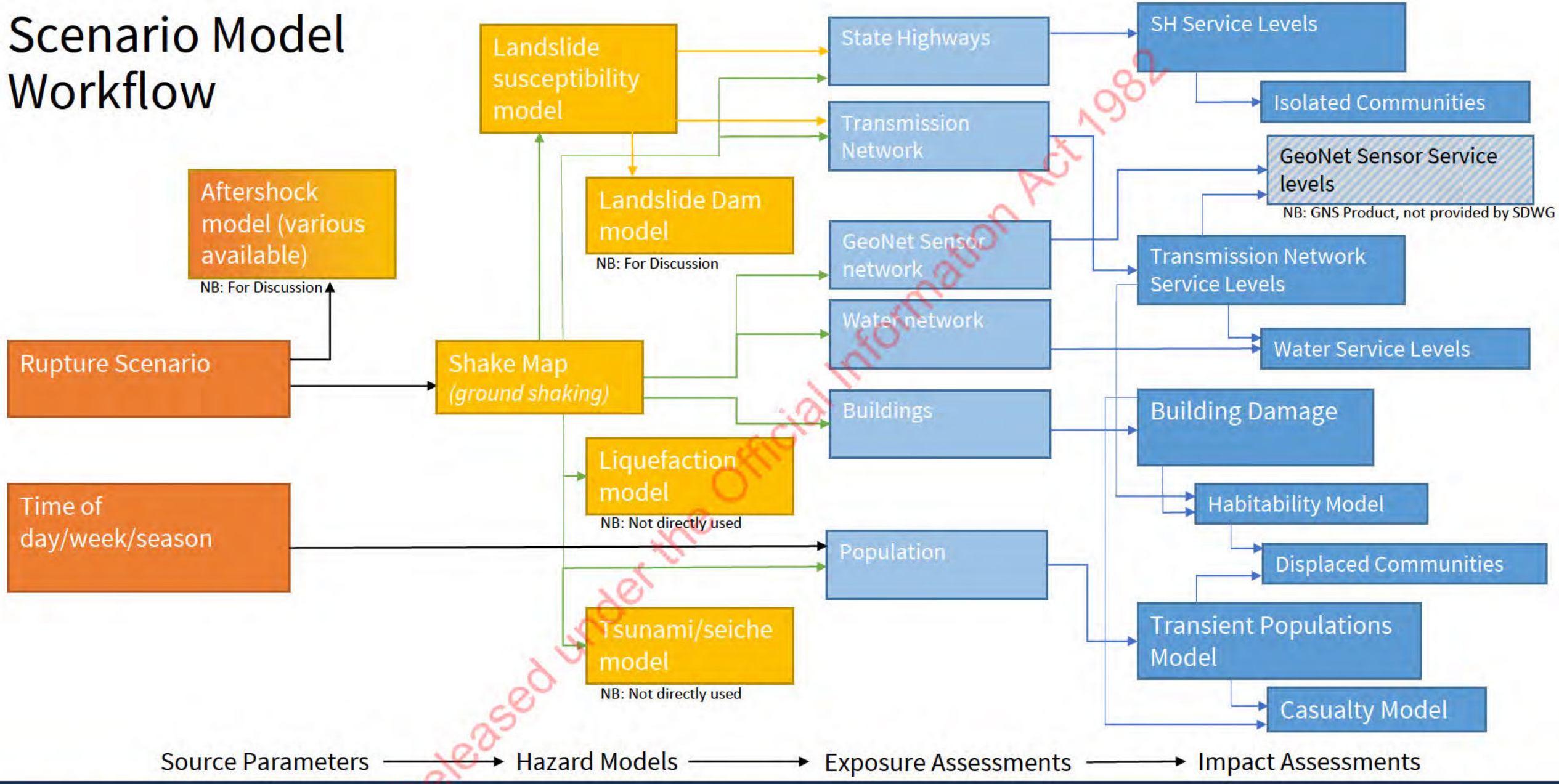
AF8
ALPINE FAULT MAGNITUDE 8

Scenario Development Methodology

- Lead/coordinated/wrangled by Alice Lake-Hammond, Tom Wilson & Tom Robinson + wider Scenario Development Working Group
- Massive assistance, input and support from wide range of science and EM sector agencies and individuals
- Four tiers of output confidence
  1. Modelled by reputable scientific individual/group
     a. SAFER Framework
     b. Bespoke Work Products for Rū Whenua
  2. Expert judgement by reputable scientific/sector individual/group
     Reviewed and approved by AF8 Scenario Development Working Group
  3. Expert judgement by NEMA Exercises
  4. Generated by other entity



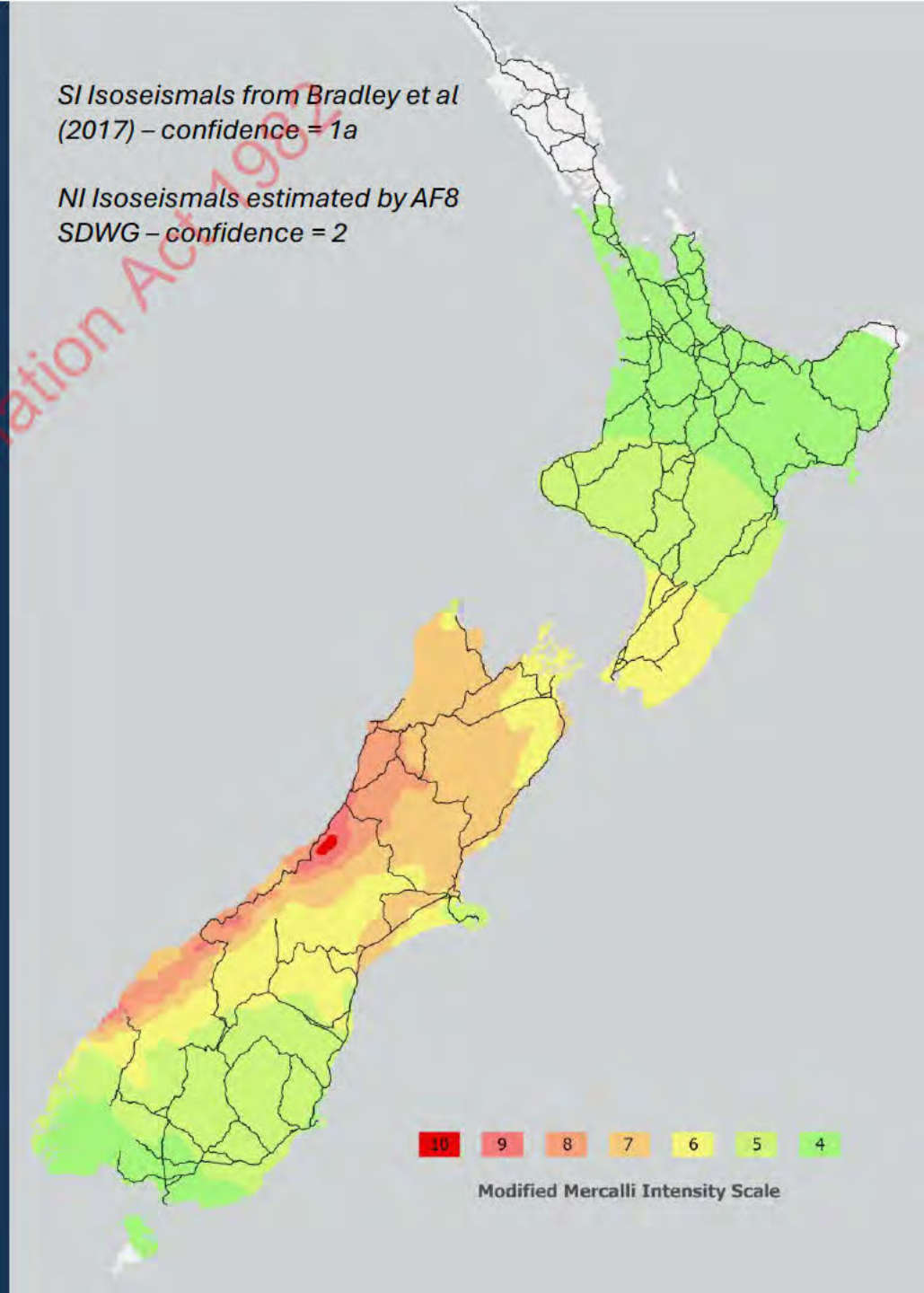
Scenario Model Workflow



Rupture Model

1a 2

- Mw 8.2 Earthquake
- c. 411 km rupture of Alpine F2K segment
  - Charles Sound to Kaniere
- Epicenter near Charles Sound w/ rupture to NE
- ‘Shallow’ depth (<15km)



AF8 ALPINE FAULT MAGNITUDE 8

Aftershocks

1a 2

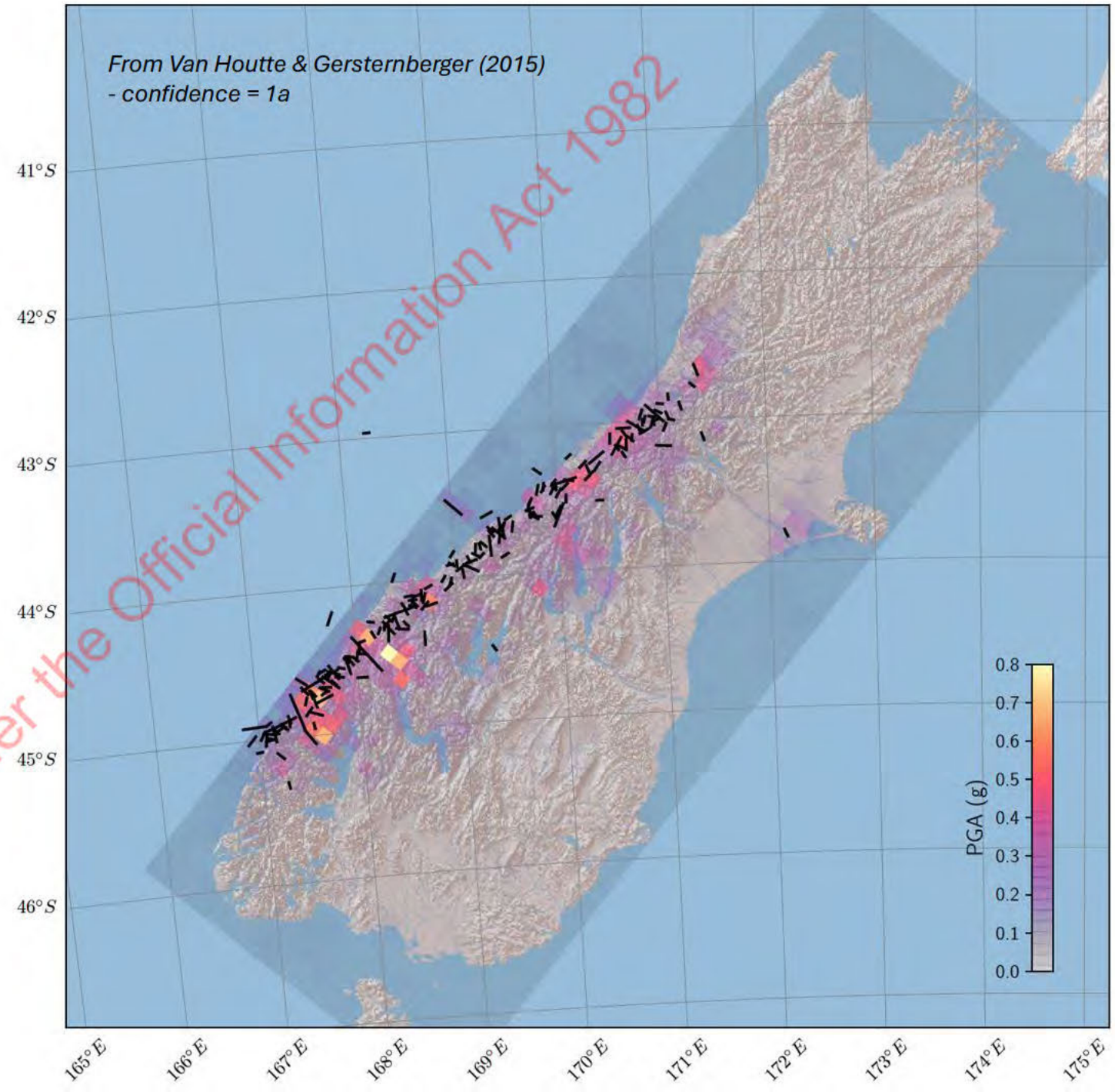
Magnitude	0-7 Days
5.0 – 5.9	215
6.0 – 6.9	20
7+	2

- One possible aftershock scenario for first 7 days
- Table shows likely aftershocks rates; map shows maximum PGA per pixel from all aftershocks

For NEMA Exercises:

- Needs discussion on NEMA Ex requirements
- This is one effective/efficient way to ramp scenario up/down as required

AF8 ALPINE FAULT MAGNITUDE 8



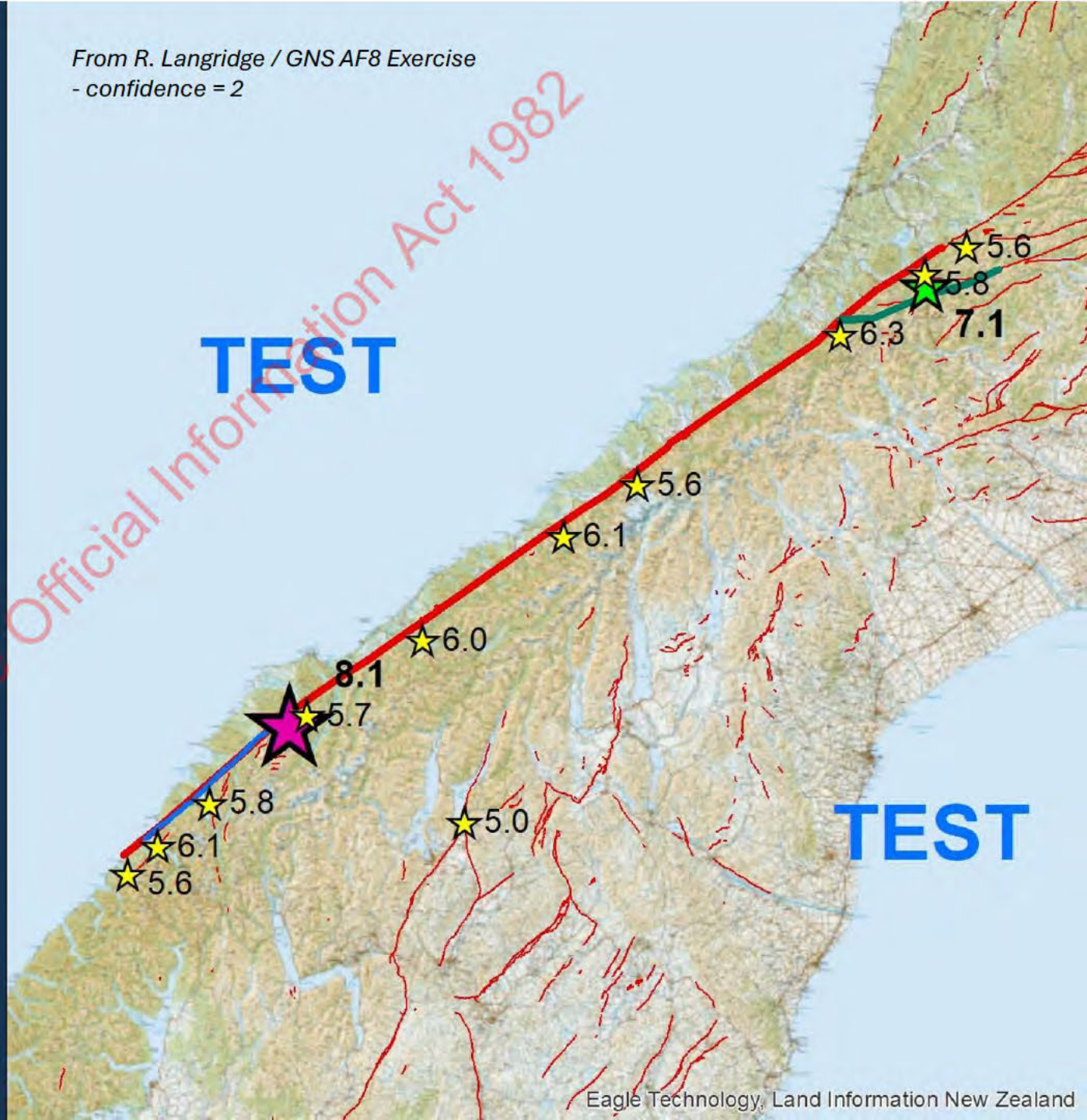
Aftershocks

1a 2

- Map shows an example Day 1 Aftershock scenario recently used by GNS in their AF8 SimEX

For NEMA Exercises:

- What are the Exercise Objectives for Day 1, 2 & 3?
- These are key for developing an Aftershock scenario
  - E.g. large aftershock on nearby faults (M7.1 on the Hope Kelly Fault in image)
  - AND/OR
  - to increase impacts in particular location (M5.0 near Wānaka in image)



AF8 ALPINE FAULT MAGNITUDE 8

Landslide Susceptibility Model

1a 2

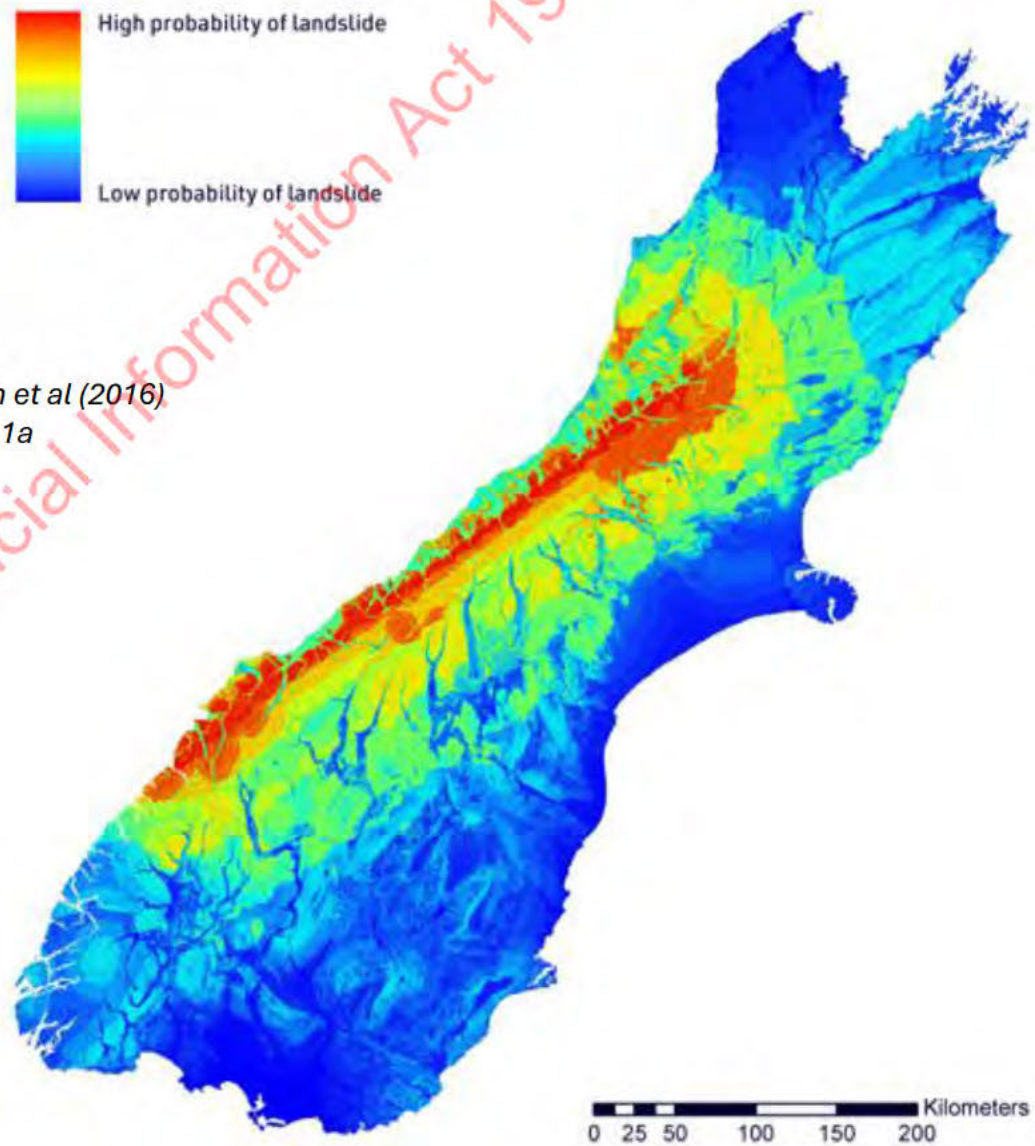
- Landslide susceptibility model showing relative likelihood of coseismic landslides
- Densest landslide occurrences in yellow-orange-red
- Up to 50,000 landslides triggered

For NEMA Exercises:

- Impacts from landslides incorporated into subsequent LoS models
- Landslide dam(s) scenarios could be developed as another simple way to scale up scenario as required

AF8 ALPINE FAULT MAGNITUDE 8

South Island state highway network exposure to Alpine Fault co-seismic landslide scenario



From Robinson et al (2016)
- confidence = 1a

Casualties / Injuries

1b

- Updated (2024) casualty model
- Casualties resulting from shaking-triggered **building damage only**
- Includes people inside & outside URM buildings + effect of people using 'Drop, Cover, Hold'
- These numbers include only **usually resident population**
- Injury Descriptions:
  - Critical – Hospital required; life threatening
  - Serious – Hospital required; non-life threatening
  - Moderate – Community clinic required

AF8 ALPINE FAULT MAGNITUDE 8

From N. Horspool (GNS) bespoke for Rū Whenua - confidence = 1b

Est Casualties per TA – **Local Pop Only**

TA Name	Moderate Injuries	Serious Injuries	Critical Injuries	Deaths
Ashburton District	360	44	6	19
Buller District	250	33	3	10
Central Otago District	10	0	0	0
Christchurch City	1020	47	3	5
Clutha District	0	0	0	0
Dunedin City	20	1	0	0
Gore District	0	0	0	0
Grey District	700	136	14	58
Hurunui District	70	4	0	1
Invercargill City	0	0	0	0
Kaikoura District	30	3	0	1
Mackenzie District	10	1	0	0
Marlborough District	240	27	3	8
Nelson City	350	23	2	2
Queenstown-Lakes District	40	2	0	0
Selwyn District	320	35	4	9
Southland District	10	0	0	0
Tasman District	390	24	2	4
Timaru District	720	113	27	93
Waimakariri District	600	57	7	18
Waimate District	20	1	0	0
Waitaki District	10	1	0	0
Westland District	430	75	7	19

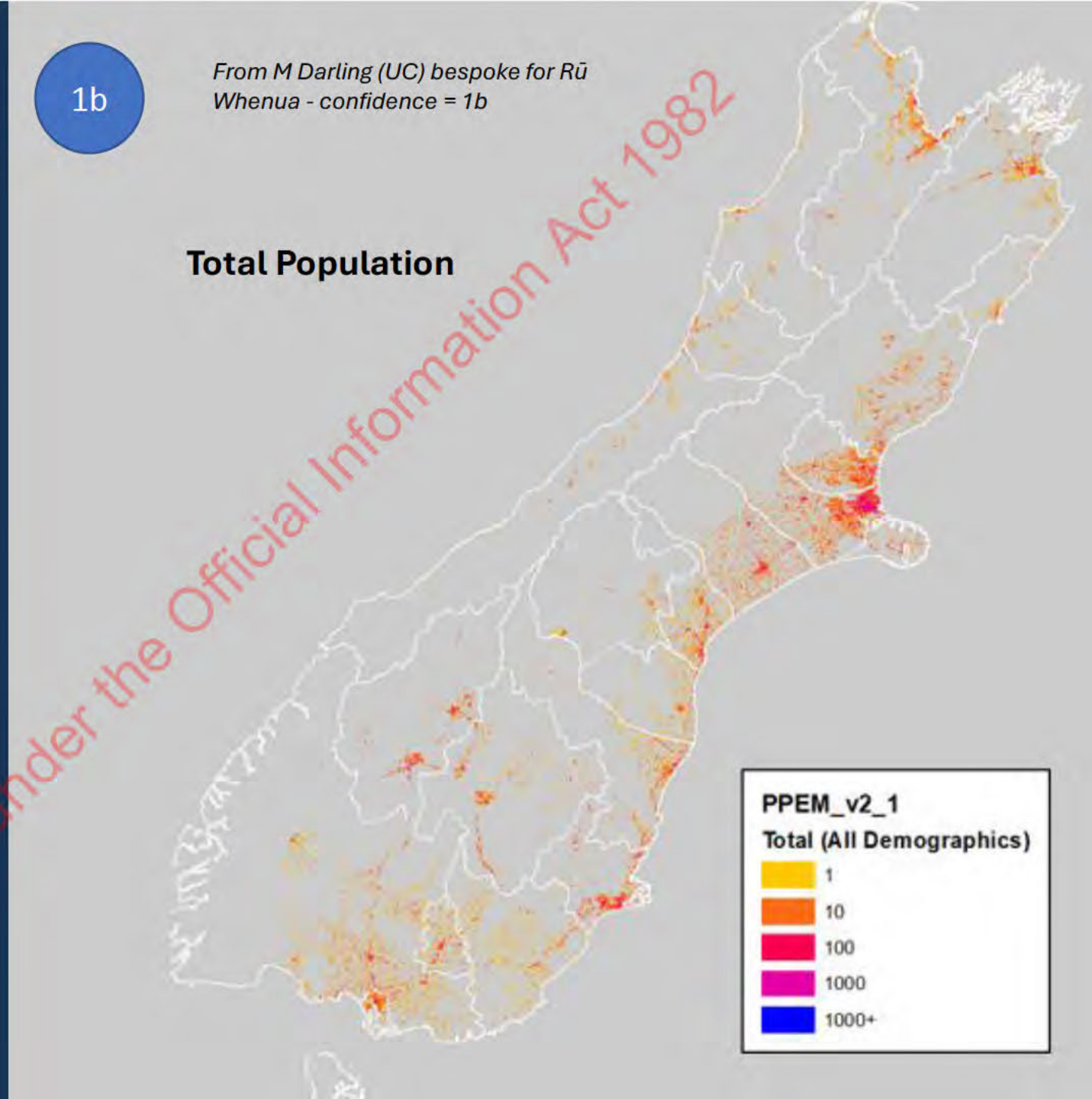
Transient Communities

- Location of Usually Resident, Domestic non-locals, and International visitors per 300 m x 300 m cells
- Based on anonymized mobile phone data records for June 2023, Google Analytics & expert elicitation
- *[Map shows total (all demographics) population – can also provide breakdown by demographic]*

1b

From M Darling (UC) bespoke for Rū Whenua - confidence = 1b

Total Population



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Modifications to Casualty model by AF8 SDWG

FOR DISCUSSION w/ NEMA EXERCISES

- The AF8 SDWG have made the following reasonable modifications to the raw casualty model:
- Increase Casualties by addition of Domestic and International Transients on a ratio-based attribution
- Increase Casualties by ~10% for non-shaking related events, e.g. medical events, rockfall

- *Note to NEMA Exercises: QTL is unlikely to suffer many casualties – shaking is too low. Power loss in winter with high displacement and isolation is a more reasonable alternative with longer term issues*
- *Wellington & Lower Hutt casualties estimated by AF8 SDWG based on 2016 Kaikōura EQ*

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Modified Casualties / Injuries

1b 2

TA	Moderate Injuries			Serious Injuries			Critical Injuries			Fatalities		
	Locals	Domestics	Internationals	Locals	Domestics	Internationals	Locals	Domestics	Internationals	Locals	Domestics	Internationals
Ashburton District	396	18	3	48	2	0	7	0	0	21	1	0
Buller District	275	59	2	36	8	0	3	1	0	11	2	0
Central Otago District	11	2	0	0	0	0	0	0	0	0	0	0
Christchurch City	1122	94	14	52	4	1	3	0	0	6	0	0
Clutha District	0	0	0	0	0	0	0	0	0	0	0	0
Dunedin City	22	2	0	1	0	0	0	0	0	0	0	0
Gore District	0	0	0	0	0	0	0	0	0	0	0	0
Grey District	770	156	14	150	31	3	15	3	0	64	13	1
Hurunui District	77	3	1	4	0	0	0	0	0	1	0	0
Invercargill City	0	0	0	0	0	0	0	0	0	0	0	0
Kaikoura District	33	52	1	3	6	0	0	0	0	1	2	0
Lower Hutt City	500	40	5	20	2	0	0	0	0	0	0	0
Mackenzie District	11	8	1	1	1	0	0	0	0	0	0	0
Marlborough District	264	48	3	30	6	0	3	1	0	9	1	0
Nelson City	385	41	4	25	2	0	2	0	0	2	0	0
Queenstown-Lakes District	44	11	1	2	1	0	0	0	0	0	0	0
Selwyn District	352	14	2	39	1	0	4	0	0	10	0	0
Southland District	11	1	0	0	0	0	0	0	0	0	0	0
Tasman District	429	25	2	26	1	0	2	0	0	4	0	0
Timaru District	792	178	8	124	28	1	30	7	0	102	23	1
Waimakariri District	660	24	4	63	2	0	8	0	0	20	1	0
Waimate District	22	10	0	1	0	0	0	0	0	0	0	0
Waitaki District	11	3	0	1	0	0	0	0	0	0	0	0
Wellington City	1000	100	15	50	5	0	0	0	0	0	0	0
Westland District	473	84	3	83	14	1	8	1	0	21	3	0
Demographic Total	***7660***	***973***	***83***	***759***	***114***	***6***	***85***	***13***	***0***	***272***	***46***	***2***
Total		***8716***			***879***			***98***			***326***	

AF8 ALPINE FAULT MAGNITUDE 8

Base model from N. Horspool (GNS) bespoke for Rū Whenua, adapted by AF8 SDWG - confidence = 2

Potential Event Modifiers for Consideration
FOR DISCUSSION w/ NEMA EXERCISES

- In addition to the reasonable adjustments to the casualty model by the AF8 SDWG, some specific hazard events NEMA may wish to consider are outlined below. These are suggestions for discussion only at this stage

- Landslide-triggered tsunami in Piopiotahi Milford Sound affecting an over-night cruise (c. 78 people affected)
- Reductions to key health facilities at e.g. Nelson Hospital or Timaru Hospital requiring structural assessments
- Landslide dams and consequent impacts at key locations e.g. Waimakariri Gorge

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Displaced Communities

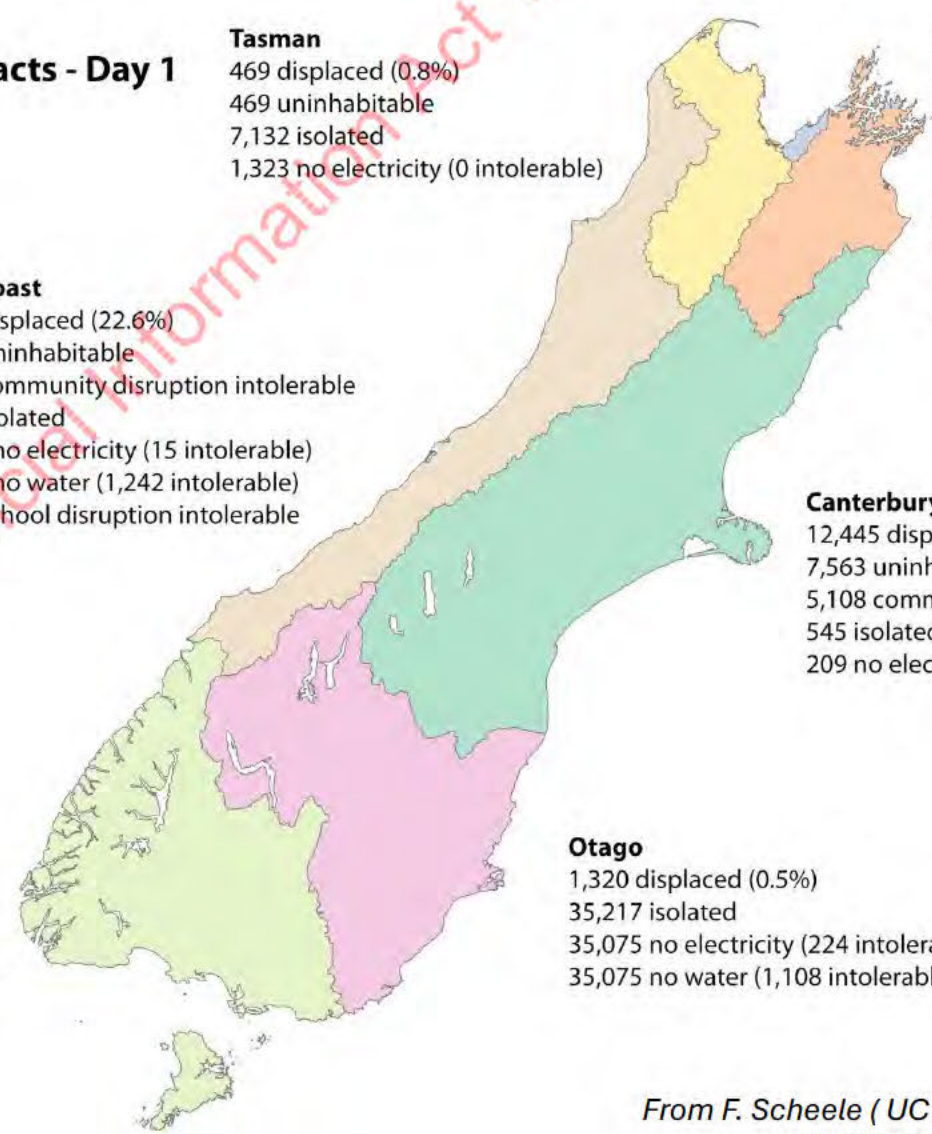
- Loss of habitability based on building damage and SH and Power LoS
- These numbers include only **usually resident population**
- *[See slide 14 for details on Isolated Population]*

For NEMA Exercises:

- Need to consider the isolation and displacement of domestic & international tourists
- Displacement tolerances are likely lower than for locals

1b

Est Displaced/Isolated – **Local Pop Only**

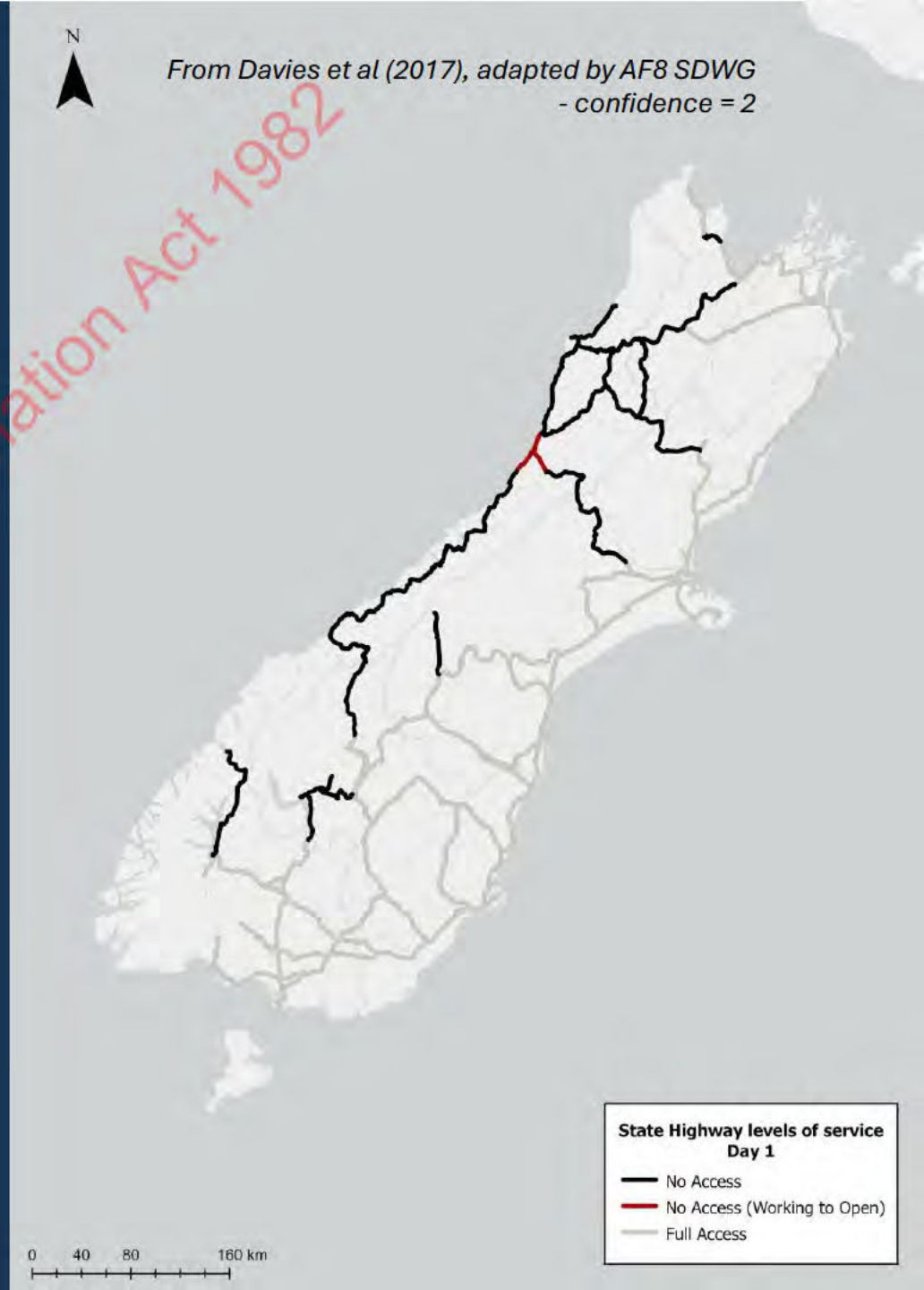


From F. Scheele (UC & GNS) bespoke for Rū Whenua - confidence = 1b

State Highways: level of service

1a 2

- Assumed service levels on Day 1
- Based on initial model focused exclusively on West Coast Region
- Extended by AF8 SDWG to include LoS on SH6A (Nevis Bluff), SH80, SH60 (Takaka Hill), & Crown Range



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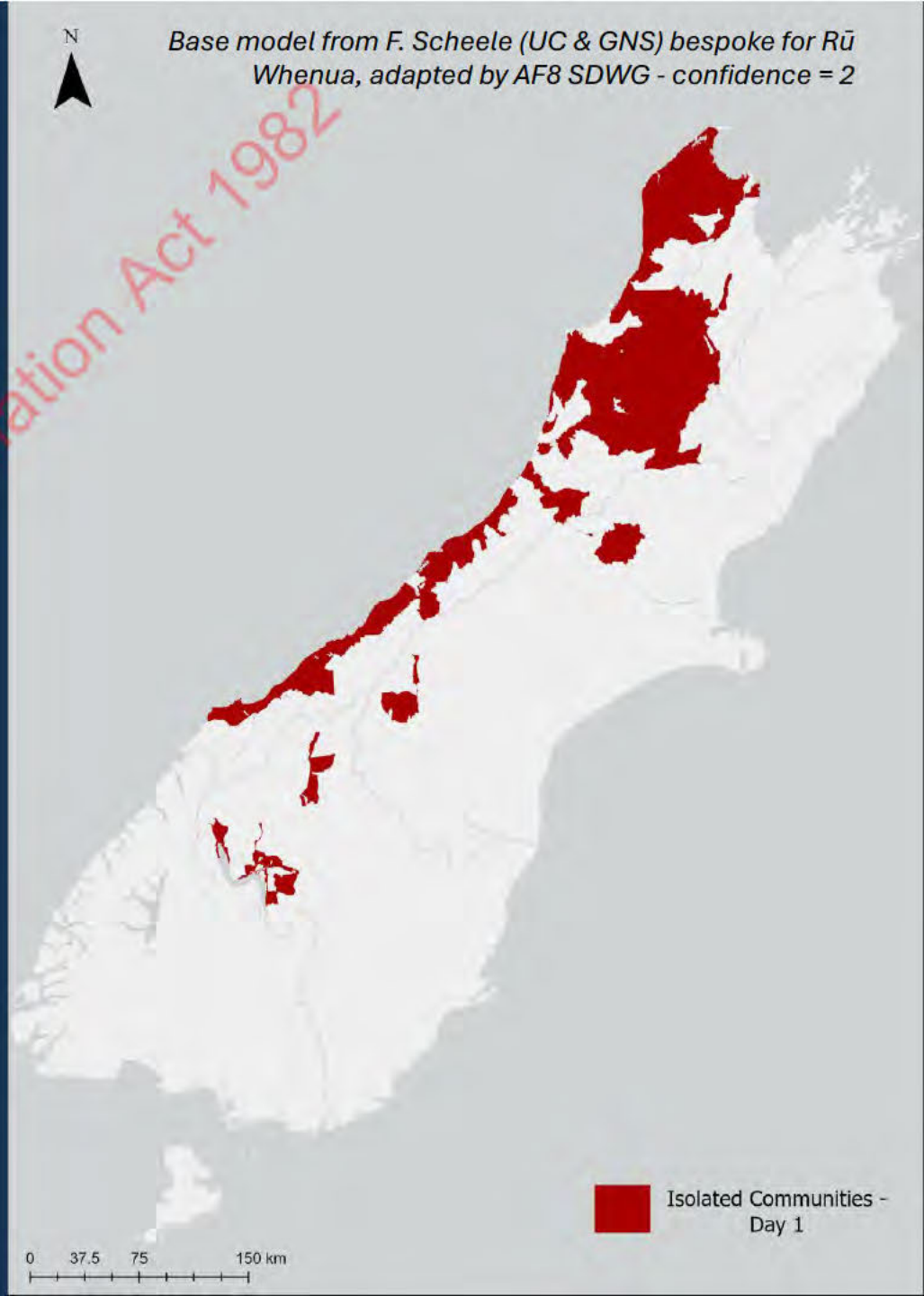
Isolated Communities

1b 2

- Defined as whether each household **is able to access any one of: Hokitika, Greymouth, Westport or Christchurch**
- Derived from SH network disruption
- Extended to include Queenstown Lakes and Golden Bay by AF8 SDWG
- Shows only isolated SA1 units with non-zero usually resident population



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Power: level of service

1a 2

- LoS resulting from disruption of transmission – generation and distribution networks outside West Coast Region considered robust
- Map Timeline shows Day 1 network rebuild

For NEMA Exercises:

- *This is not a 'black start' – generation retained in the SI and NI + Inter-island cable stays online*
- *This is close to upper end of the scenario – less severe scenarios are possible*

Based on Robinson et al (2015) and Davies et al (2017), adapted by AF8 SDWG - confidence = 2

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Water: level of service

2 4

- Based on data from reports by West Coast Lifelines and Taumata Arowai
- Results from direct damage to pipes and/or Power LoS
  - Those due to Power LoS return to full service when power restored

Location	LoS	Reason
Westport	No service	Direct Damage
Reefton	No service	Direct Damage
Greymouth	No service	Direct Damage
Runanga/Rapahoe	No service	Direct Damage
Hokitika	No service	Direct Damage
Fox Glacier	No service	Direct Damage
Franz Josef	No service	Direct Damage
Blackball	Reduced service	Direct Damage
Hari Hari	Reduced service	Direct Damage
Kumara	Reduced service	Direct Damage
Murchison	Reduced service	Direct Damage
Wellington City	Reduced service	Direct Damage
Hanmer Springs	Reduced service	Power LoS
Tasman District	Reduced service	Power LoS
Queenstown	Reduced service	Power LoS
Wellington Region	Reduced service	Power LoS

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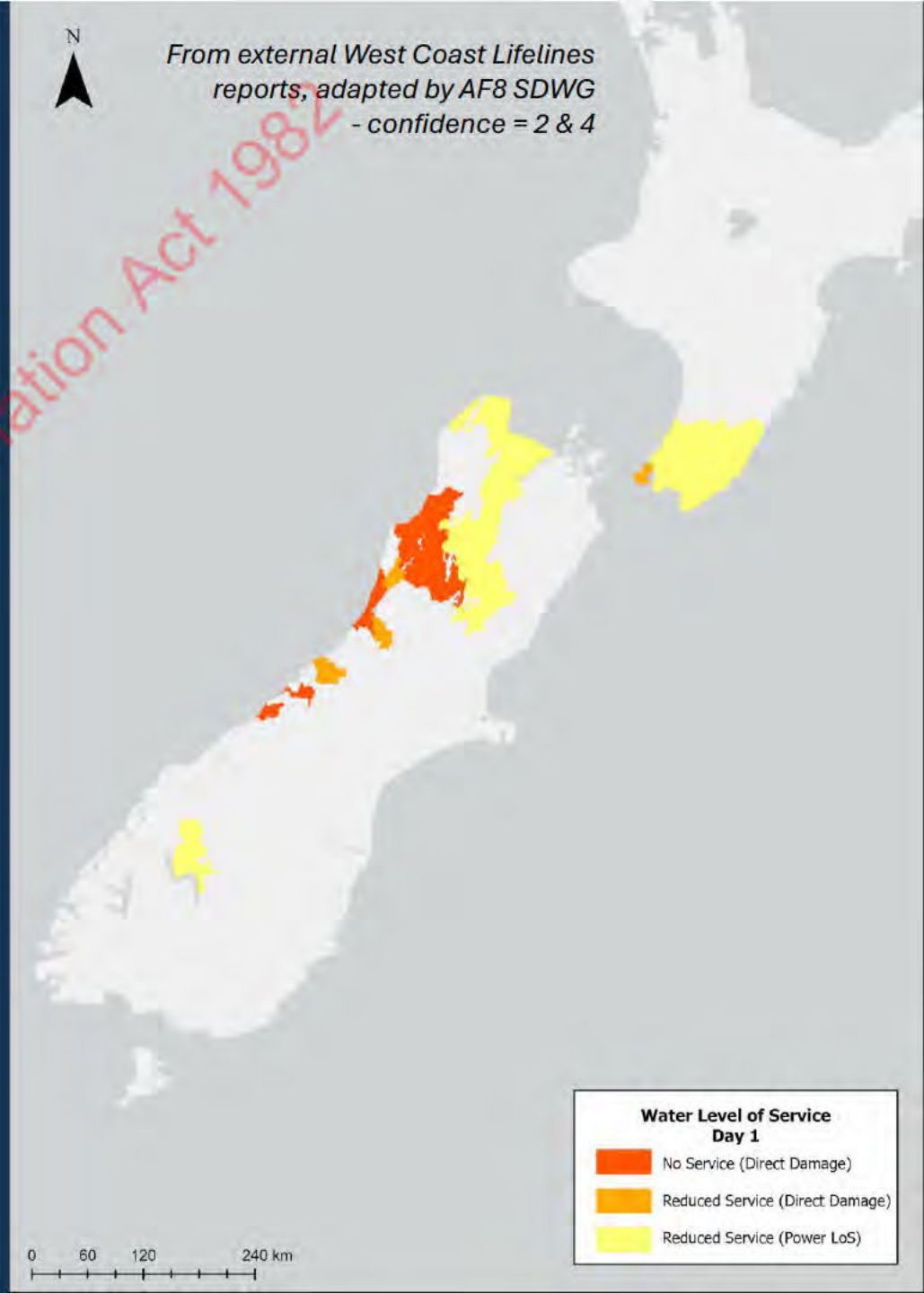

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EMERGENCY MANAGEMENT SOUTHLAND
Te Rākau Whakamarumaru Murihiku

Emergency Management Canterbury

Emergency Management Otago
Te Rākau Whakamarumaru Ōtākou

WEST COAST EMERGENCY MANAGEMENT GROUP

NELSON TASMAN EMERGENCY MANAGEMENT GROUP

Marlborough Emergency Management GROUP

Toka Tū Ake EQC

RESILIENCE TO NATURE'S CHALLENGES
Kia manawaroa – Ngā Ākina o Te Ao Tūroa

National SCIENCE Challenges

QuakeCoRE
NZ Centre for Earthquake Resilience
Te Hiranga Rū

GNS SCIENCE TE PŪ AO

National Emergency Management Agency
Te Rākau Whakamarumaru

UNIVERSITY of OTAGO
Te Whare Wānanga o Otāgo
NEW ZEALAND

UC UNIVERSITY OF CANTERBURY
Te Whare Wānanga o Waitaha
CHRISTCHURCH NEW ZEALAND

THE UNIVERSITY OF AUCKLAND
Te Whare Wānanga o Tāmaki Makaurau
NEW ZEALAND

TE HERENGA WAKA
WELLINGTON
VICTORIA UNIVERSITY OF WELLINGTON

EXERCISE EXERCISE EXERCISE

Modeled information and science update

For use as guide until on-ground data received

Prepared by Prof Tom Wilson // NEMA Chief Science Advisor

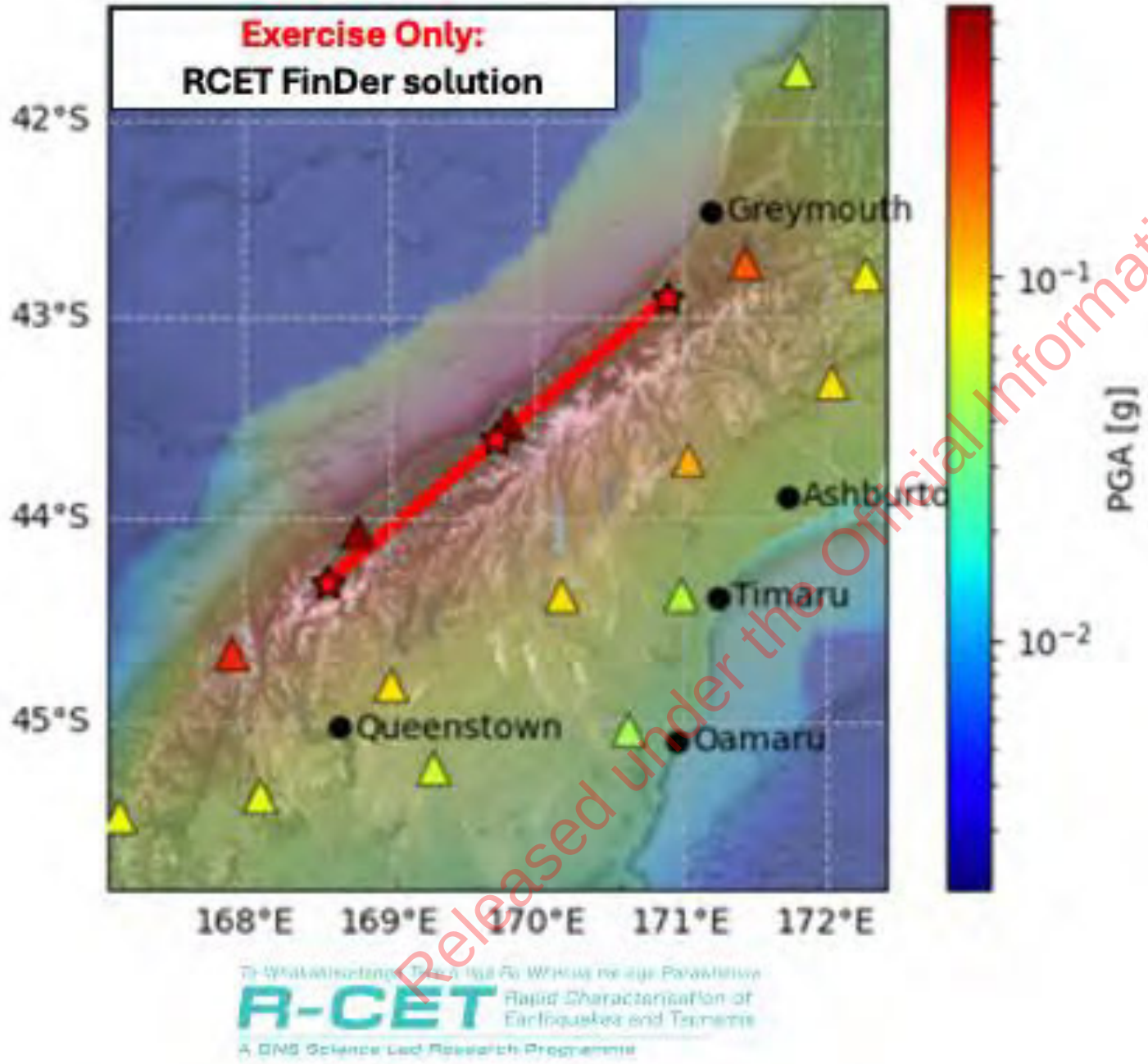
thomas.Wilson@nema.govt.nz

RRP – Date stamp: 10.00 12 June 2024

Key Messages

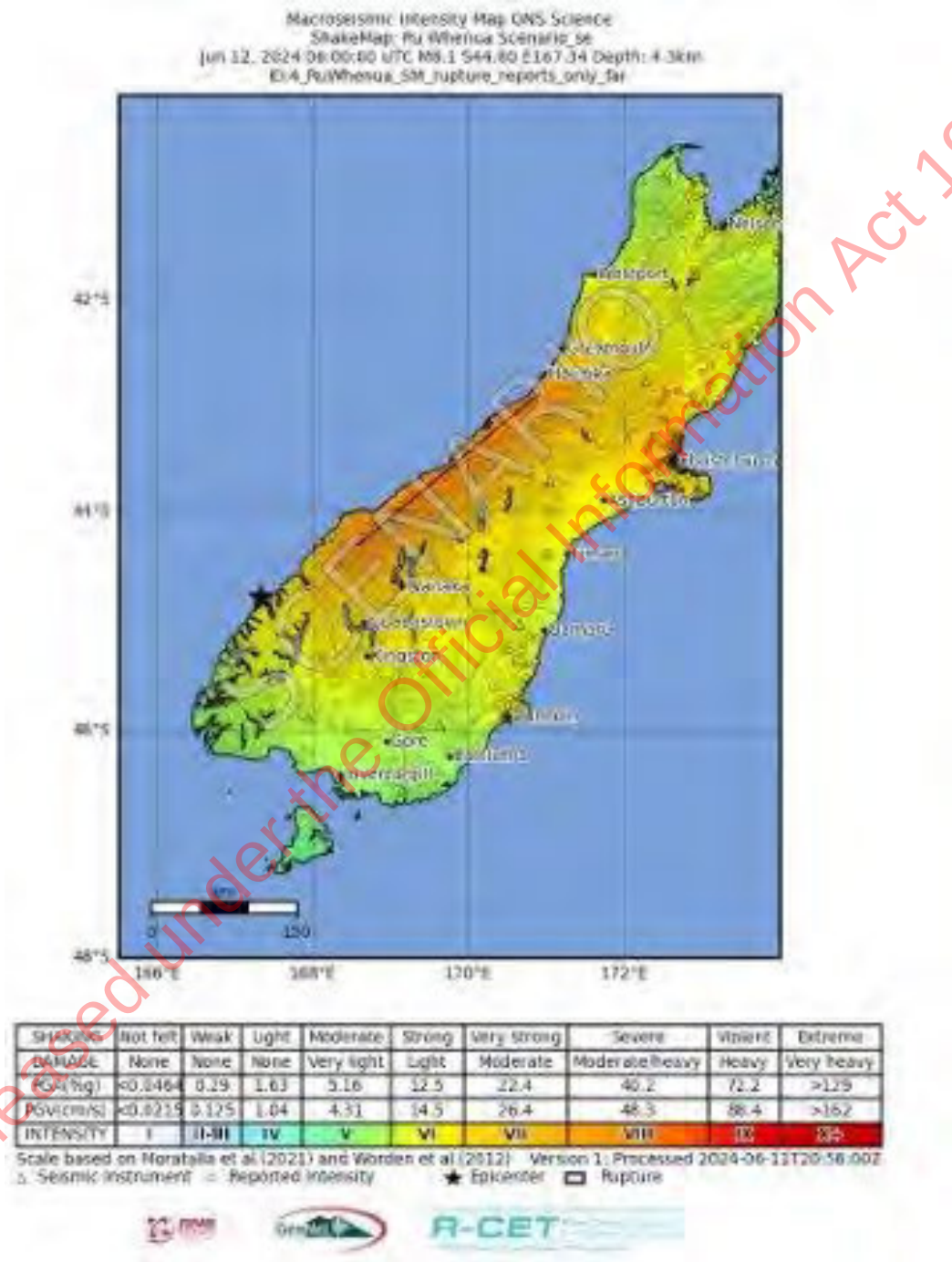
- Magnitude 8.1, Alpine Fault
- Earthquake extends from Fiordland to Greymouth
- Surface rupture likely along the fault trace
- Widespread built environment and lifeline damage and landslides
- Ongoing aftershock sequence – including large aftershocks, landsliding, shaking, potential tsunami
- Reminder: Long and Strong, Get Gone!

- Science Advice Function Stood Up – GNS active at level 4



- Magnitude 8.1
- Best science maps rupture farther toward Greymouth, extending along most of West Coast
- surface rupture likely along the fault trace
- Teams deploying

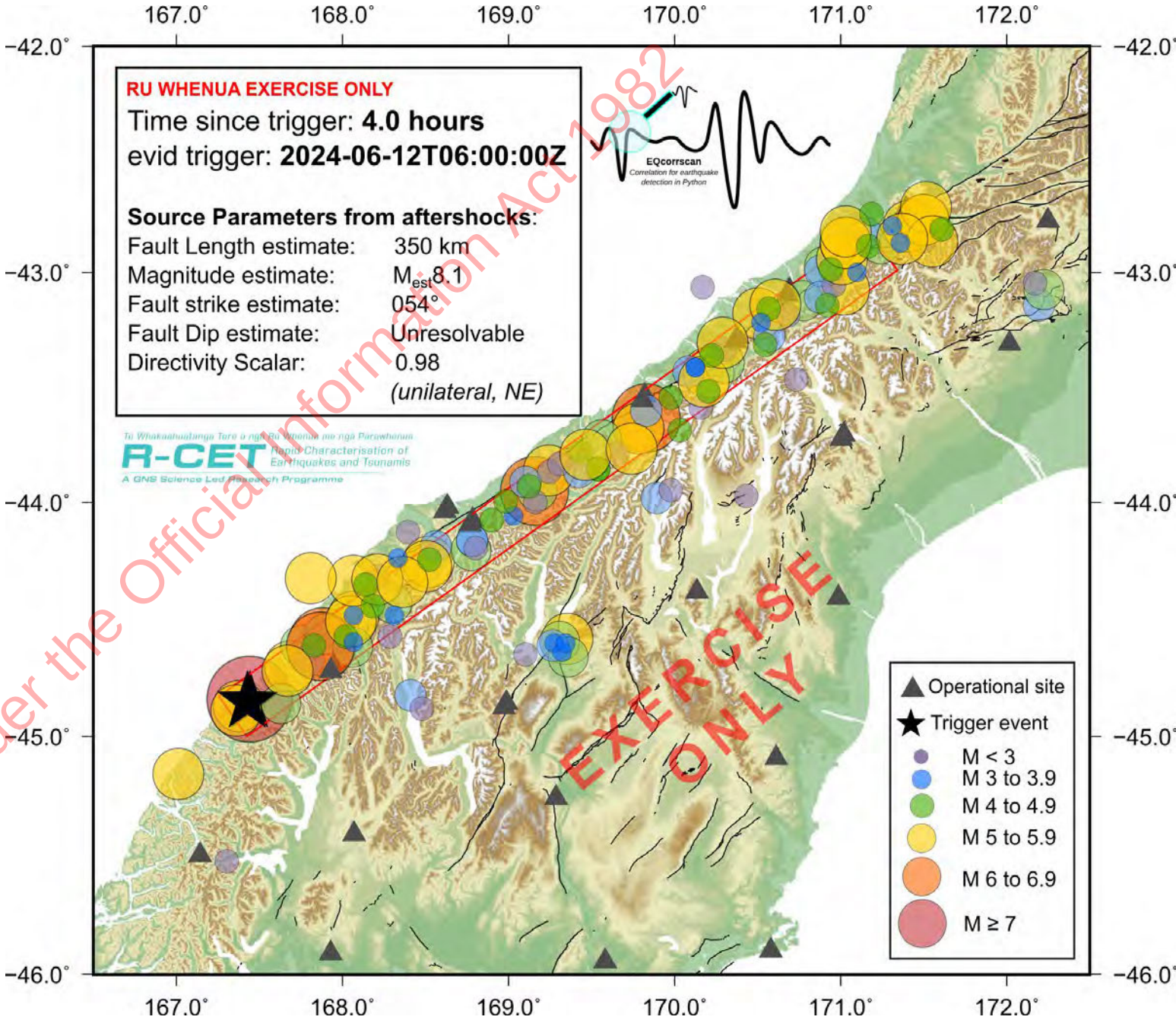
Ex_Rū Whenua



New estimate likely overestimates shaking in Canterbury.

Recorded Aftershocks, 10:45hr

>MS – 44
>M6 – 5
Long period directed pulse towards Nelson and Wellington – concern for larger buildings (inspections, etc.) in upper South Island, lower North Island

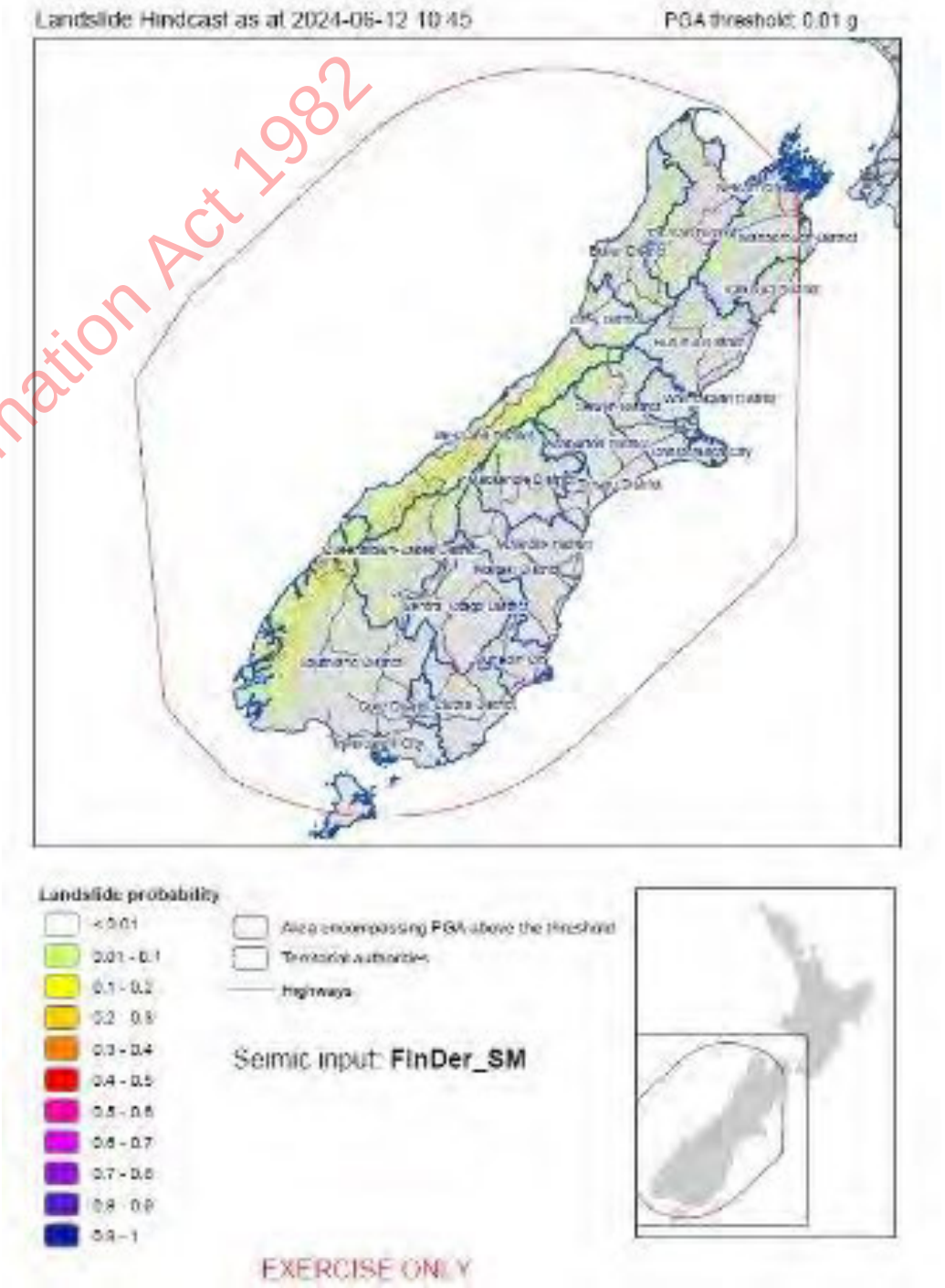


Aftershock Forecast, as calculated as of 12/06/24,10:30hr

	M5-M6			M6-M7			M7+		
	Average number	Range *	Probability of 1 or more	Average number	Range *	Probability of 1 or more	Average number	Range *	Probability of 1 or more
within 1 days	76	59-93	>99%	7.1	2-13	>99%	0.73	0-3	52%
within 7 days	144	121-168	>99%	13	7-21	>99%	1.4	0-4	75%
within 30 days	192	166-220	>99%	18	10-27	>99%	1.8	0-5	83%

Earthquake-Induced Landslide Hindcast (possibly already happened because of NW8.1

- Tens to hundreds of thousands of landslides expected
- Across the hilly parts of the South Island, in particular Southern Alps and Fiordland
- Landslide dams reported already, more expected (Franz Josef and Arthur's Pass Areas)



PRE MODELLED

1a 2

Aftershocks

- Table shows likely aftershocks rates for South Island spatial area.
- Aftershock earthquakes likely clustered at **northern** and **southern** end of ruptured fault.
- Be especially mindful this event may increase likelihood of other large faults rupturing (>M7.0 Eqs) in northern South Island – north Canty, Nelson, Marlborough etc.
  - But could also occur in Southland.

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PRE-MODELLED – not for current event. Use only as guide until formal GNS product comes out

Magnitude	0-7 Days
5.0 – 5.9	215
6.0 – 6.9	20
7+	2

PRE MODELLED

Landslide Susceptibility Model

1a 2

- Landslide susceptibility model showing relative likelihood of coseismic landslides
- Densest landslide occurrences in yellow-orange-red
- Up to 50,000 landslides triggered

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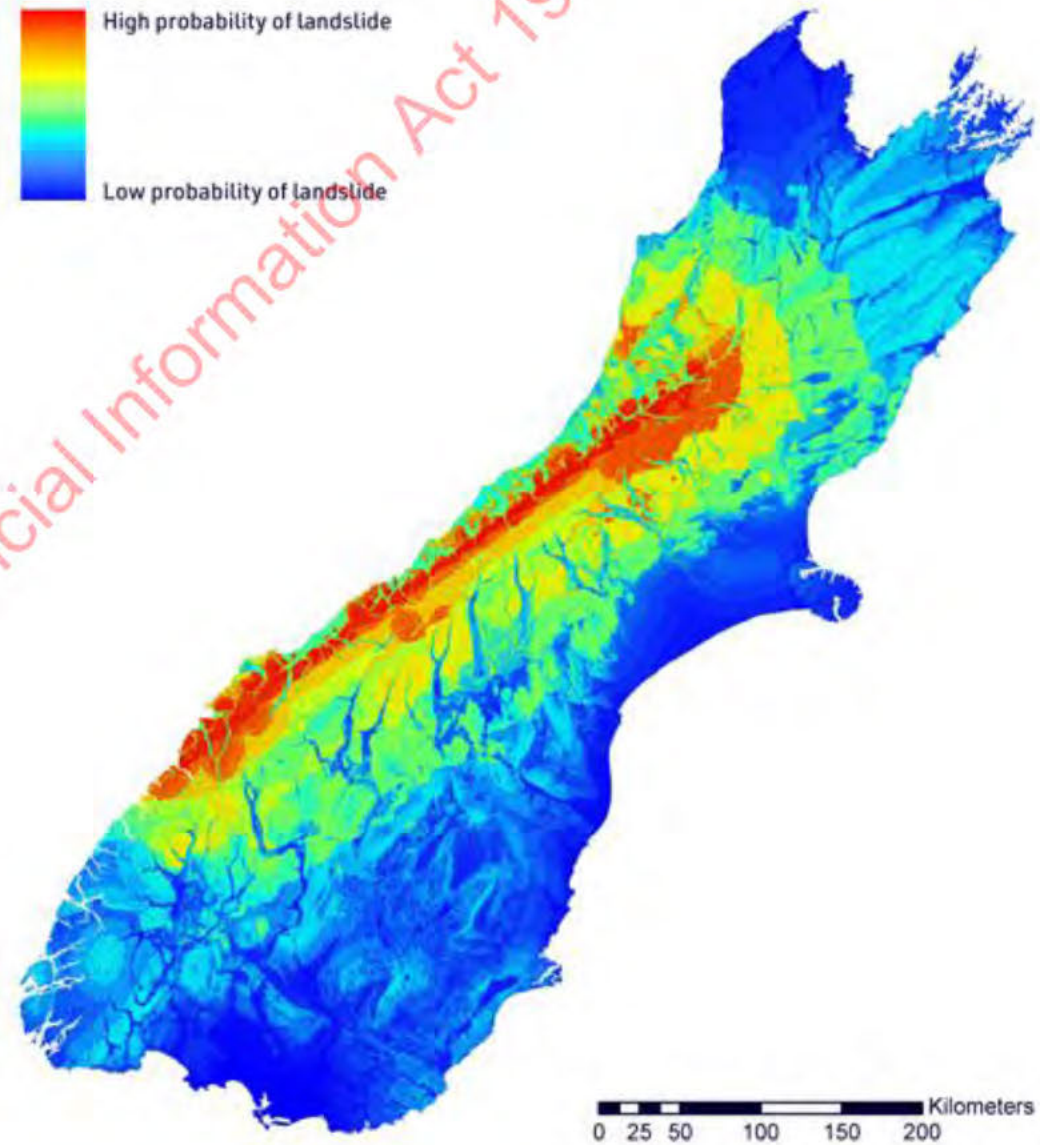
South Island state highway network exposure to Alpine Fault co-seismic landslide scenario



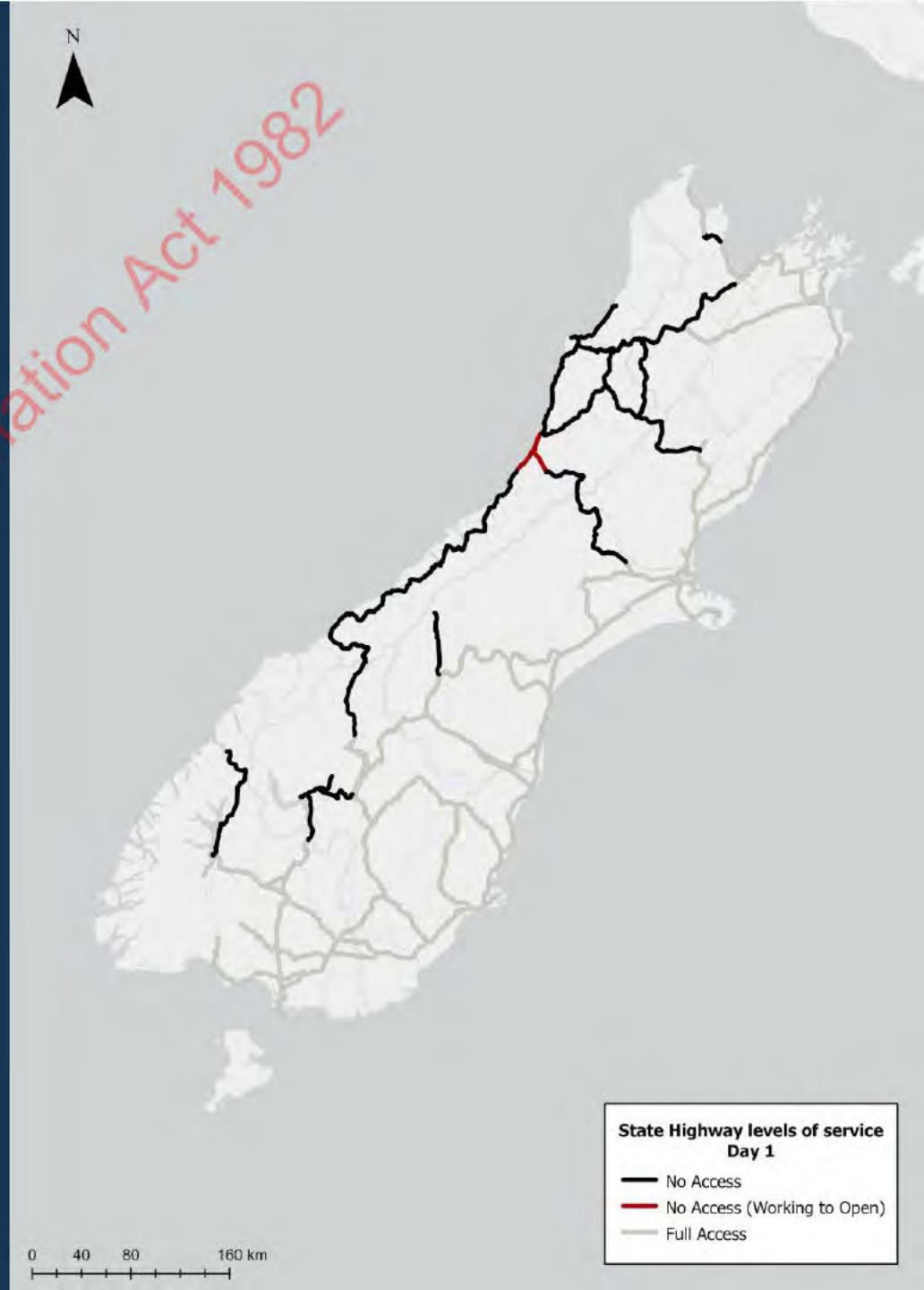
Adpated from: Robinson et al. (2016)

PRE MODELLED

State Highways: level of service

- Assumed service levels on ‘Day 1’

SH1 following 2016 Kaikōura EQ



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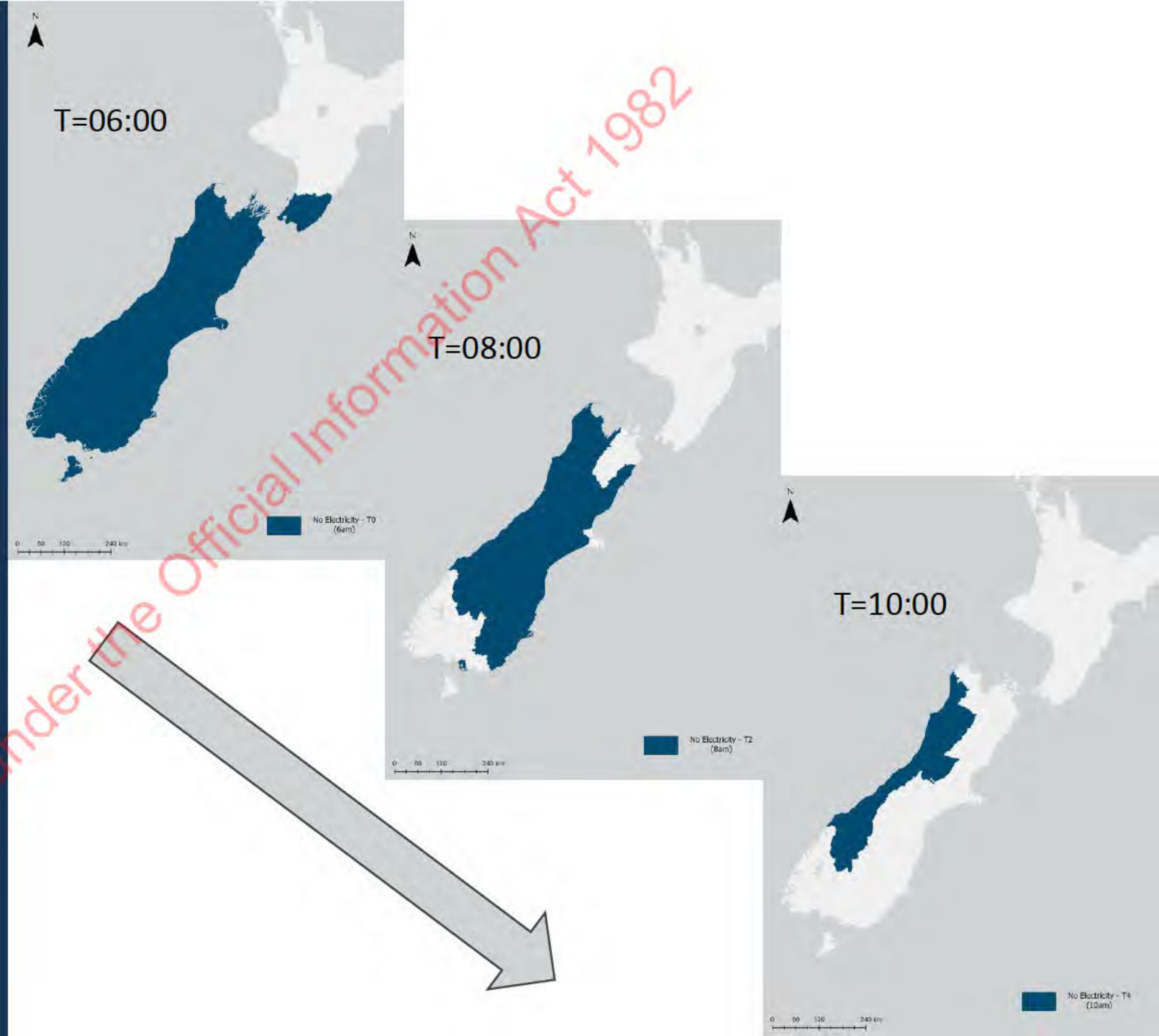
PRE MODELLED

Power:
level of service

- LoS resulting from disruption of transmission – generation and distribution networks outside West Coast Region considered robust
- Map Timeline shows a potential ‘Day 1’ network outages



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Potential Casualties / Injuries

1b 2

PRE MODELLED – **highly uncertain**; large range to modelled results!

TA	Moderate Injuries			Serious Injuries			Critical Injuries			Fatalities		
	Locals	Domestics	Internationals	Locals	Domestics	Internationals	Locals	Domestics	Internationals	Locals	Domestics	Internationals
Ashburton District	396	18	3	48	2	0	7	0	0	21	1	0
Buller District	275	59	2	36	8	0	3	1	0	11	2	0
Central Otago District	11	2	0	0	0	0	0	0	0	0	0	0
Christchurch City	1122	94	14	52	4	1	3	0	0	6	0	0
Clutha District	0	0	0	0	0	0	0	0	0	0	0	0
Dunedin City	22	2	0	1	0	0	0	0	0	0	0	0
Gore District	0	0	0	0	0	0	0	0	0	0	0	0
Grey District	770	156	14	150	31	3	15	3	0	64	13	1
Hurunui District	77	3	1	4	0	0	0	0	0	1	0	0
Invercargill City	0	0	0	0	0	0	0	0	0	0	0	0
Kaikoura District	33	52	1	3	6	0	0	0	0	1	2	0
Lower Hutt City	500	40	5	20	2	0	0	0	0	0	0	0
Mackenzie District	11	8	1	1	1	0	0	0	0	0	0	0
Marlborough District	264	48	3	30	6	0	3	1	0	9	1	0
Nelson City	385	41	4	25	2	0	2	0	0	2	0	0
Queenstown-Lakes District	44	11	1	2	1	0	0	0	0	0	0	0
Selwyn District	352	14	2	39	1	0	4	0	0	10	0	0
Southland District	11	1	0	0	0	0	0	0	0	0	0	0
Tasman District	429	25	2	26	1	0	2	0	0	4	0	0
Timaru District	792	178	8	124	28	1	30	7	0	102	23	1
Waimakariri District	660	24	4	63	2	0	8	0	0	20	1	0
Waimate District	22	10	0	1	0	0	0	0	0	0	0	0
Waitaki District	11	3	0	1	0	0	0	0	0	0	0	0
Wellington City	1000	100	15	50	5	0	0	0	0	0	0	0
Westland District	473	84	3	83	14	1	8	1	0	21	3	0
Demographic Total	***7660***	***973***	***83***	***759***	***114***	***6***	***85***	***13***	***0***	***272***	***46***	***2***
Total		***8716***			***879***			***98***			***326***	

Base model from N. Horspool (GNS) bespoke for Rū Whenua, adapted by AF8 SDWG - confidence = 2

PRE- MODELLED Building damage

Number and percent of buildings in each damage state by Territorial Authority

Excel file also provided of buildings in each damage state by SA2, broken down into residential, non-residential and mixed

Territorial Authority	Damage state				
	none	slight	moderate	extensive	complete
Ashburton District	23,431 (56%)	9,864 (23.6%)	6,565 (15.7%)	1,577 (3.8%)	414 (1%)
Buller District	4,690 (29.9%)	4,294 (27.4%)	4,592 (29.3%)	1,510 (9.6%)	606 (3.9%)
Central Otago District	27,883 (97.3%)	634 (2.2%)	131 (0.5%)	5 (0%)	0
Christchurch City	167,207 (71.3%)	38,680 (16.5%)	21,370 (9.1%)	6,070 (2.6%)	1,224 (0.5%)
Clutha District	29,550 (98.6%)	343 (1.1%)	75 (0.3%)	4 (0%)	0
Dunedin City	89,660 (99.7%)	228 (0.3%)	29 (0%)	4 (0%)	0
Gore District	15,101 (99.1%)	116 (0.8%)	14 (0.1%)	0	0
Grey District	1,597 (9.4%)	3,463 (20.3%)	5,871 (34.5%)	3,248 (19.1%)	2,840 (16.7%)
Hurunui District	13,976 (48.7%)	7,560 (26.3%)	5,488 (19.1%)	1,350 (4.7%)	332 (1.2%)
Invercargill City	42,781 (99.9%)	20 (0%)	2 (0%)	1 (0%)	
Kaikoura District	4,417 (59.8%)	1,708 (23.1%)	987 (13.4%)	234 (3.2%)	36 (0.5%)
Mackenzie District	9,154 (84.9%)	1,182 (11%)	400 (3.7%)	43 (0.4%)	5 (0%)
Marlborough District	40,033 (71.5%)	9,846 (17.6%)	5,008 (8.9%)	908 (1.6%)	166 (0.3%)
Nelson City	18,298 (58.7%)	7,640 (24.5%)	4,231 (13.6%)	829 (2.7%)	188 (0.6%)
Queenstown-Lakes District	32,571 (91.9%)	2,188 (6.2%)	606 (1.7%)	64 (0.2%)	4 (0%)
Selwyn District	42,032 (69.1%)	11,409 (18.8%)	5,910 (9.7%)	1,214 (2%)	263 (0.4%)
Southland District	60,155 (100.4%)	169 (0.3%)	56 (0.1%)	16 (0%)	4 (0%)
Tasman District	30,009 (48.9%)	16,519 (26.9%)	11,645 (19%)	2,538 (4.1%)	704 (1.1%)
Timaru District	20,106 (45.5%)	10,617 (24%)	8,913 (20.2%)	3,146 (7.1%)	1,385 (3.1%)
Waimakariri District	22,441 (42.2%)	14,535 (27.3%)	11,397 (21.4%)	3,533 (6.6%)	1,298 (2.4%)
Waimate District	13,484 (88.4%)	1,320 (8.7%)	397 (2.6%)	42 (0.3%)	6 (0%)
Waitaki District	31,236 (95.5%)	1,165 (3.6%)	274 (0.8%)	29 (0.1%)	2 (0%)
Westland District	1,794 (11.5%)	2,937 (18.8%)	5,046 (32.3%)	3,015 (19.3%)	2,847 (18.2%)

PRE-MODELLED

Direct loss to buildings

Total est. loss: $12.5billion

TA	Loss ($millions)
Ashburton District	$664
Buller District	$521
Central Otago District	$8.5
Christchurch City	$2,620
Clutha District	$3.9
Dunedin City	$8.9
Gore District	$1.1
Grey District	$1,563
Hurunui District	$345
Invercargill City	$0.2
Kaikoura District	$70.2
Mackenzie District	$28.7
Marlborough District	$346
Nelson City	$548
Queenstown-Lakes District	$56.2
Selwyn District	$496
Southland District	$8.6
Tasman District	$931
Timaru District	$1,795
Waimakariri District	$1,256
Waimate District	$22.2
Waitaki District	$19.4
Westland District	$1,192
Total	**$12,500**

PRE MODELLED

Water: level of service

2 4

- Based on data from reports by West Coast Lifelines and Taumata Arowai
- Results from direct damage to pipes and/or Power LoS
  - Those due to Power LoS return to full service when power restored

Location	LoS	Reason
Westport	No service	Direct Damage
Reefton	No service	Direct Damage
Greymouth	No service	Direct Damage
Runanga/Rapahoe	No service	Direct Damage
Hokitika	No service	Direct Damage
Fox Glacier	No service	Direct Damage
Franz Josef	No service	Direct Damage
Blackball	Reduced service	Direct Damage
Hari Hari	Reduced service	Direct Damage
Kumara	Reduced service	Direct Damage
Murchison	Reduced service	Direct Damage
Wellington City	Reduced service	Direct Damage
Hanmer Springs	Reduced service	Power LoS
Tasman District	Reduced service	Power LoS
Queenstown	Reduced service	Power LoS
Wellington Region	Reduced service	Power LoS

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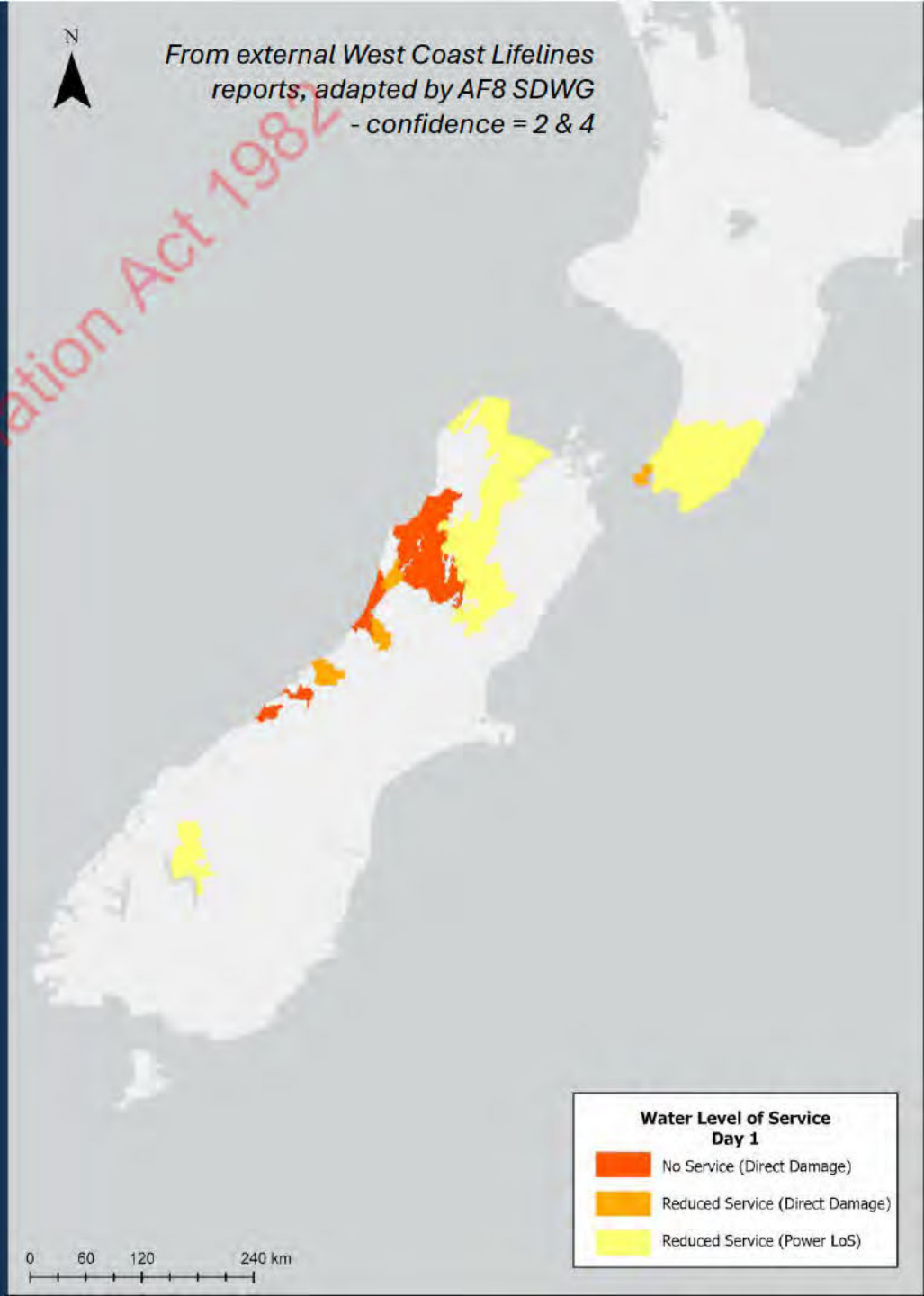

PRE MODELLED

Isolated Communities

1b 2

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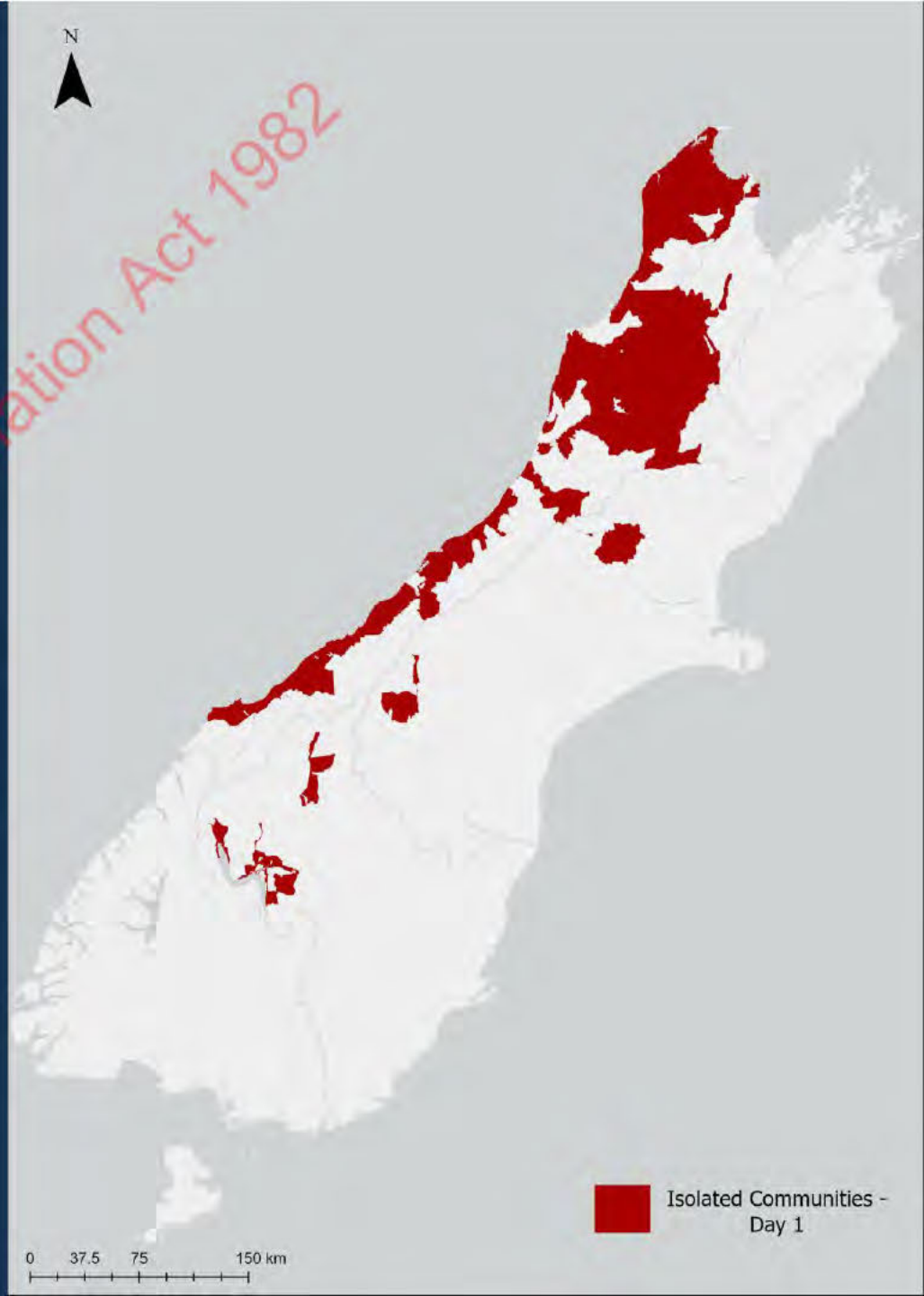
- Derived from SH network disruption
- Extended to include Queenstown Lakes and Golden Bay by AF8 SDWG
- Shows only isolated SA1 units with non-zero usually resident population



AF8 ALPINE FAULT MAGNITUDE 8

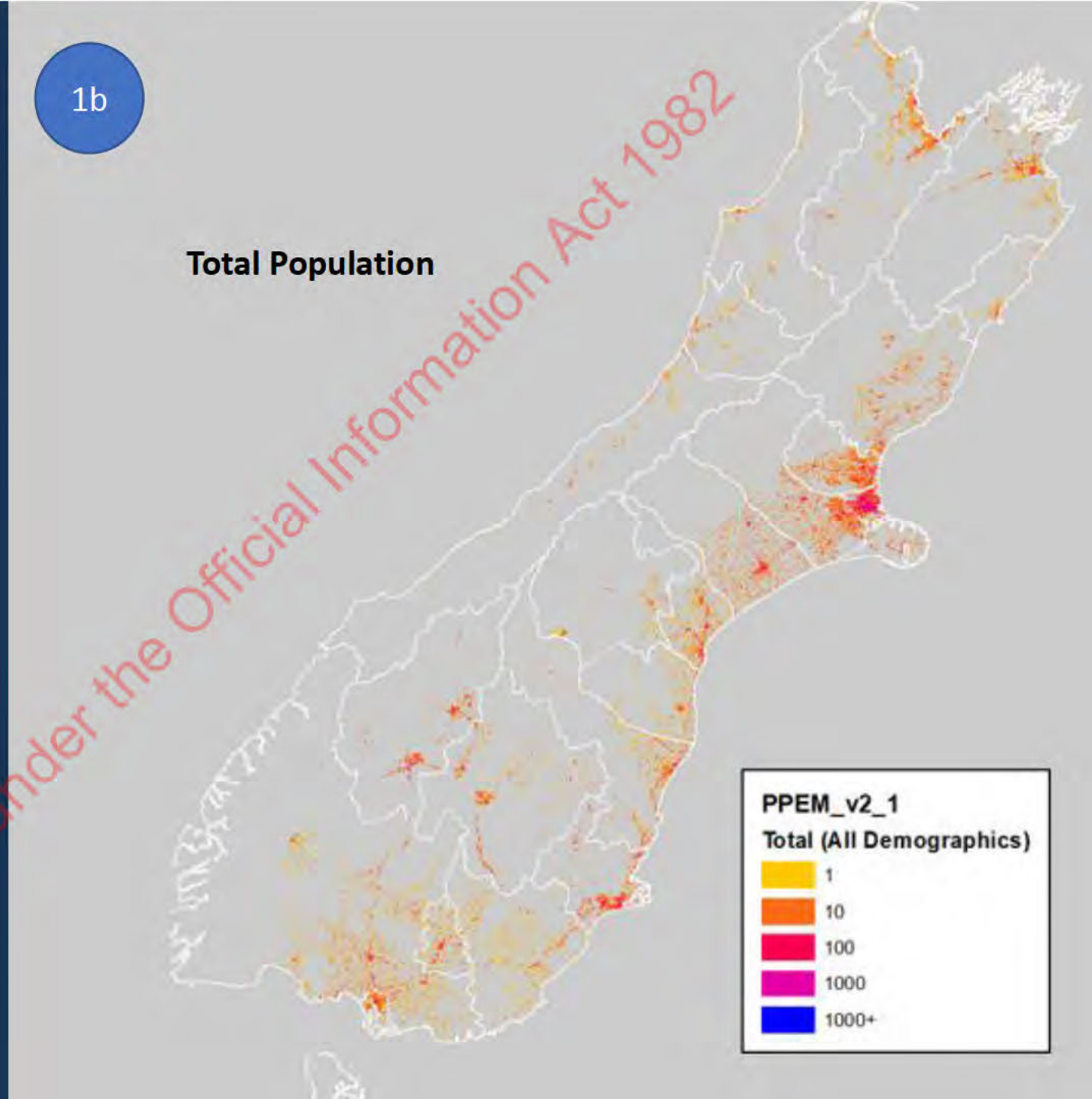
PRE MODELLED

Transient Communities

- Location of Usually Resident, Domestic non-locals, and International visitors per 300 m x 300 m cells
- Based on anonymized mobile phone data records for June 2023, Google Analytics & expert elicitation
- *[Map shows total (all demographics) population – can also provide breakdown by demographic]*

1b

Total Population



AF8
ALPINE FAULT MAGNITUDE 8

PRE MODELLED
Displaced Communities

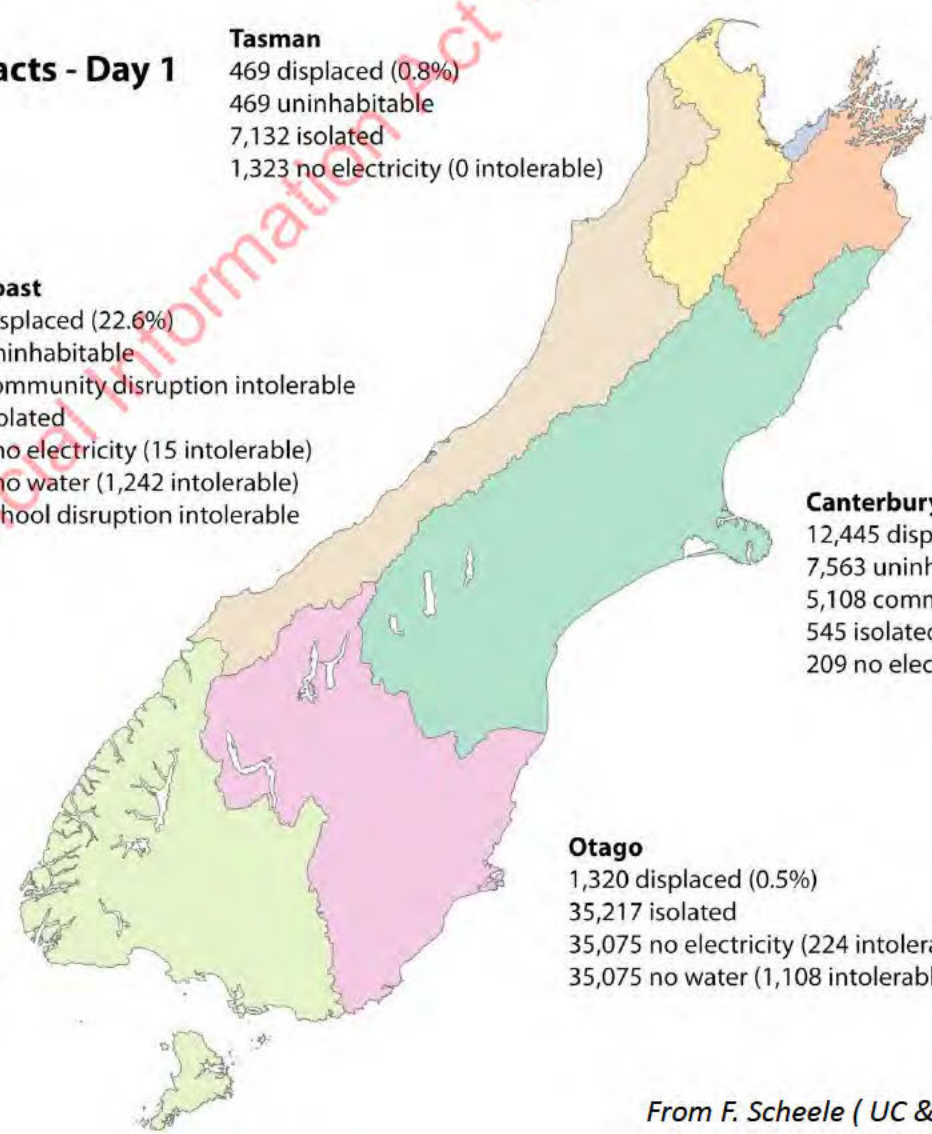
- Loss of habitability based on building damage and SH and Power LoS
- These numbers include only **usually resident population**
- *[See slide 14 for details on Isolated Population]*

For NEMA Exercises:

- Need to consider the isolation and displacement of domestic & international tourists
- Displacement tolerances are likely lower than for locals

1b

Est Displaced/Isolated – **Local Pop Only**



Household impacts - Day 1

Tasman
469 displaced (0.8%)
469 uninhabitable
7,132 isolated
1,323 no electricity (0 intolerable)

Nelson
325 displaced (0.6%)
325 uninhabitable
46 isolated

Marlborough
304 displaced (0.6%)
304 uninhabitable
62 isolated

West Coast
7,424 displaced (22.6%)
4,040 uninhabitable
1,892 community disruption intolerable
8,178 isolated
32,862 no electricity (15 intolerable)
22,844 no water (1,242 intolerable)
1,017 school disruption intolerable

Canterbury
12,445 displaced (1.9%)
7,563 uninhabitable
5,108 community disruption intolerable
545 isolated
209 no electricity (1 intolerable)

Otago
1,320 displaced (0.5%)
35,217 isolated
35,075 no electricity (224 intolerable)
35,075 no water (1,108 intolerable)

Southland
No displacement
287 isolated

From F. Scheele (UC & GNS) bespoke for Rū Whenua - confidence = 1b

Telecommunications and People

- Telecommunications essential for post-disaster response coordination and community well-being
- Loss of roads means movement of people is difficult
- Loss of electricity means disruption of telecommunications

Overview

- **What might an Mw8.2 Alpine Fault earthquake look like?**
- **Likely consequences (modelled)?**

Acknowledgements:

- **AF8 Programme**
- **Ex. Rū Whenua Scenario Development Working Group**

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Alpine Fault earthquake – how likely?

- The Alpine Fault has a long history of large earthquakes
- Remarkably regular and no reason they won't continue
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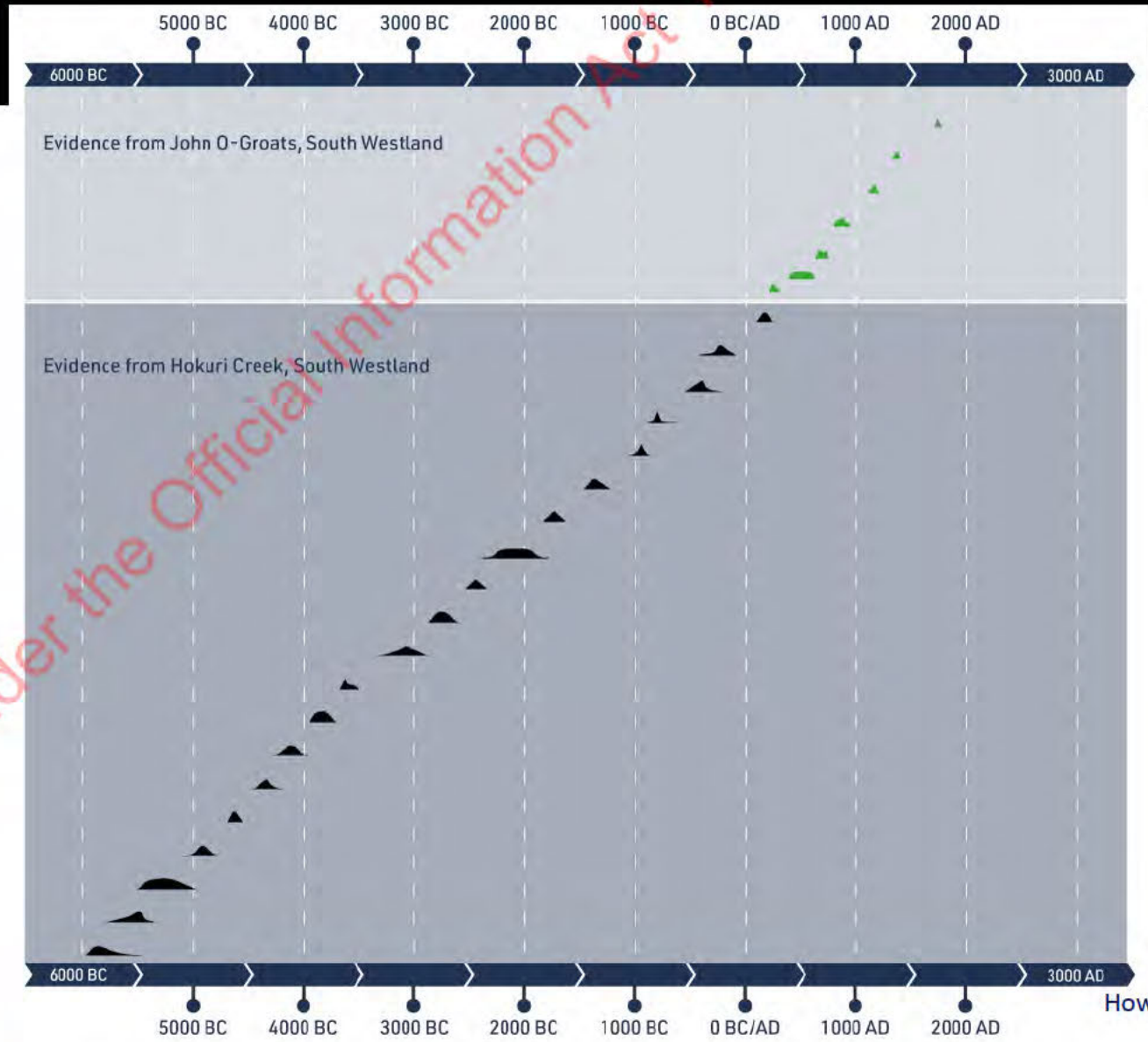

Howarth et al. 2021

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ALPINE FAULT MAGNITUDE 8

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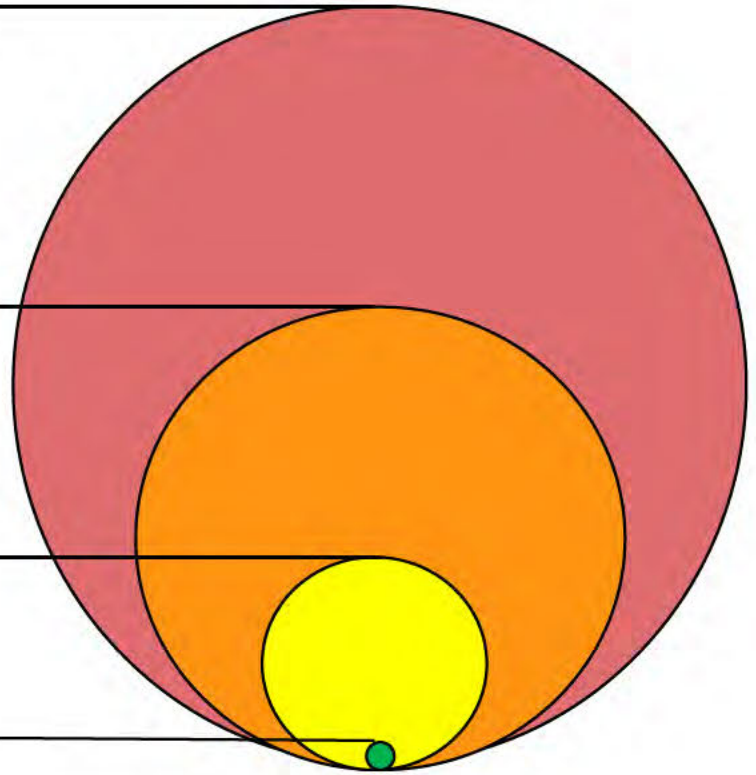

Ex. Rū Whenua ‘Day 2’: A more extreme scenario

2018

AF8 Hazard Scenario and SAFER Framework

Credible scenario based on available science at the time

12 June 2024

Rū Whenua
AF8 Macro Scenario
T4EX Day 1

‘Median’ scenario updated with latest hazard and risk science

26 June 2024

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‘Extreme’ but scientifically credible scenario, drawing from upper range of modelled outputs 7-10 days after initial EQ

10 July 2024

Rū Whenua
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~1 month after initial EQ, building from Day 2 scenario modelled impacts and workshop decisions

exercise rū whenua

NATIONAL EXERCISE PROGRAMME
INTERAGENCY CAPABILITY BUILDING

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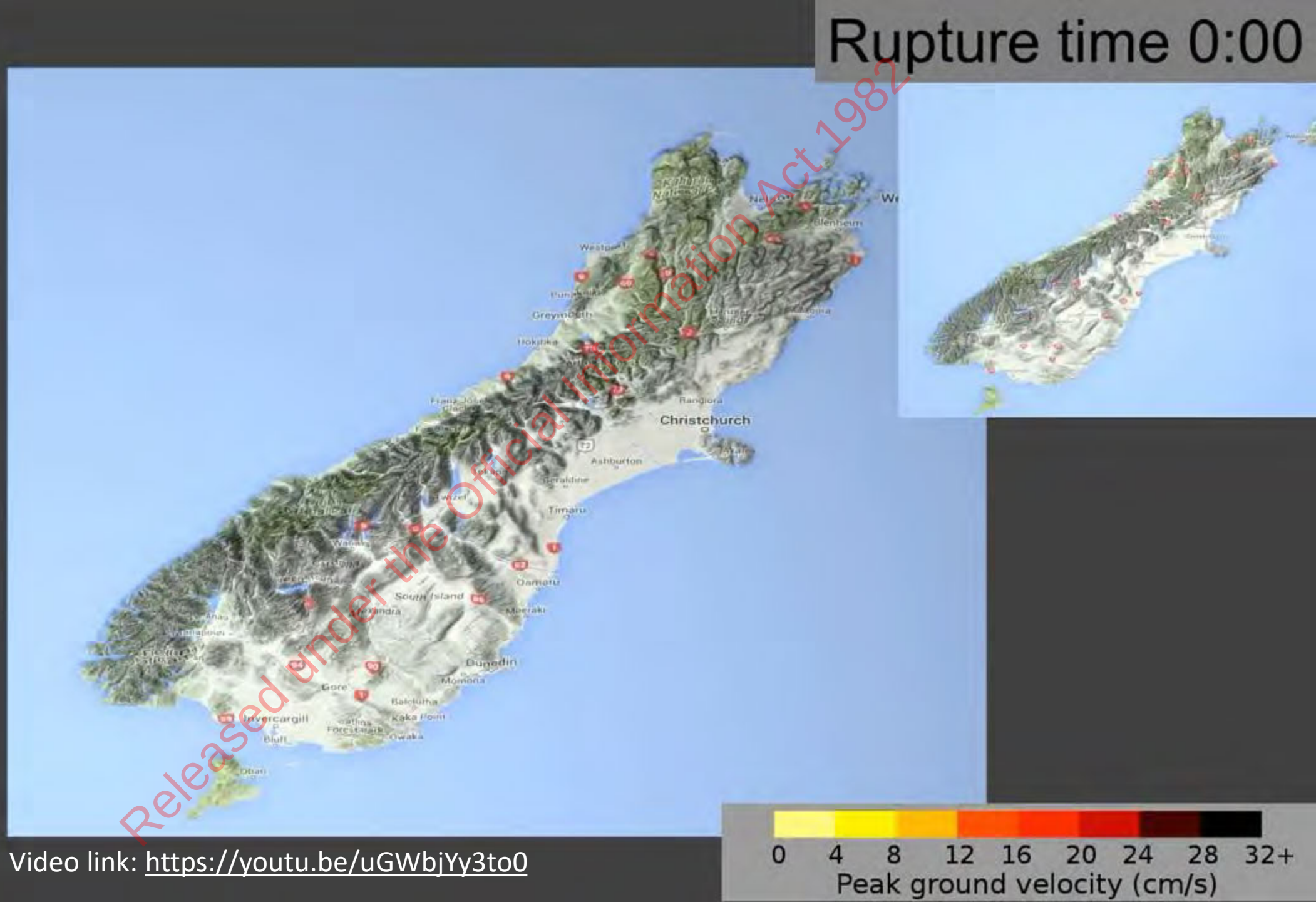
ALPINE FAULT MAGNITUDE 8



Bradley (2016)

Video link: https://youtu.be/uGWbjYy3to0

The Scenario

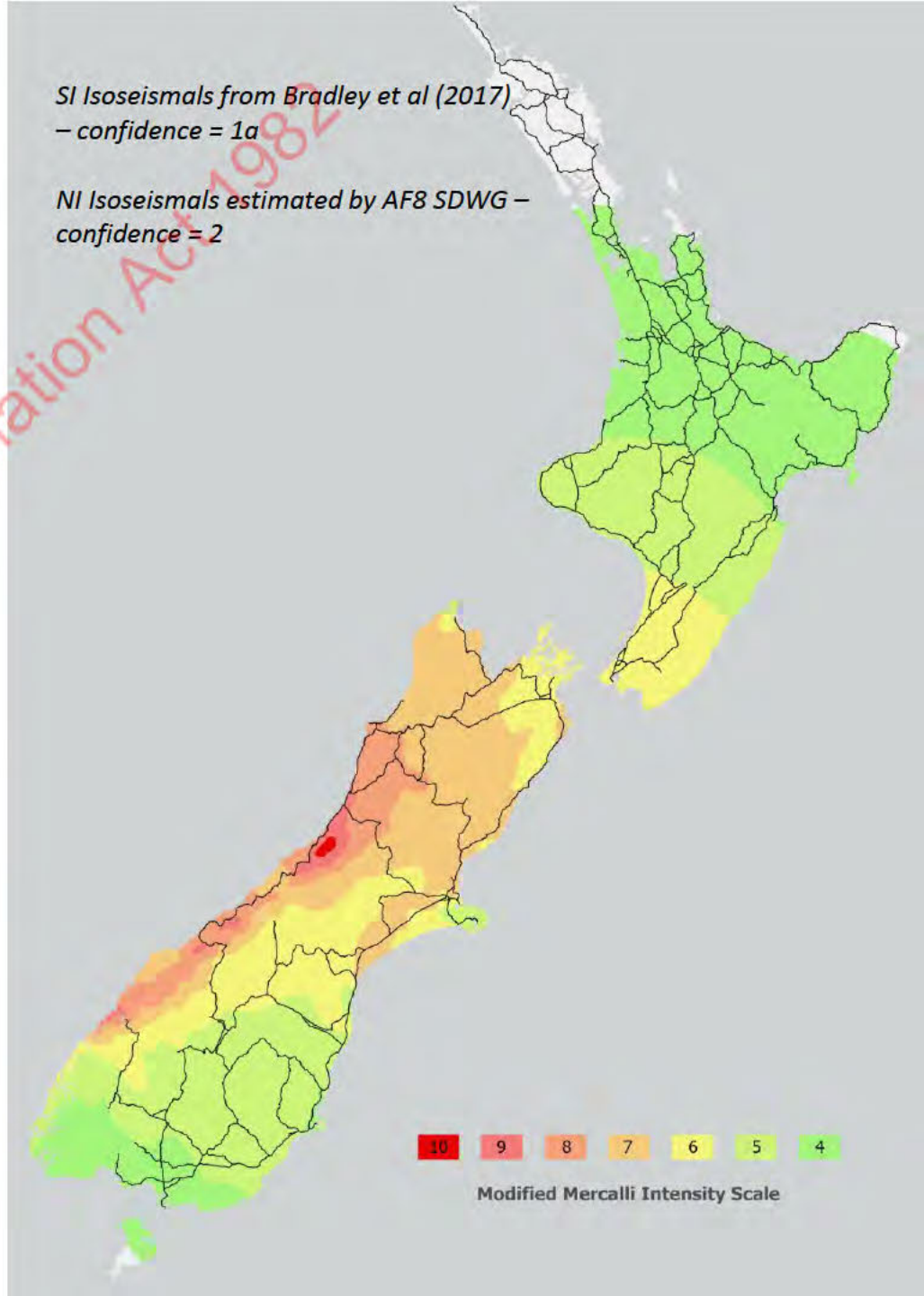
1a 2

- **Mw 8.2 Earthquake** at **1500** in **early July**; south to north rupture
- **Weather**
  - **Day 0** is a very cold but clear (blue bird) day with **large numbers of skiers** on slopes
  - **Day +10** a second **polar blast expected** bringing heavy snow, cold conditions
- **Fault rupture**: ~410 km
  - Up to 8 m horizontal displacement
  - Up to 2m vertical displacement

MM 04	Largely observed
MM 05	Strong
MM 06	Slightly damaging
MM 07	Damaging
MM 08	Heavily damaging
MM 09	Destructive
MM 10	Very destructive

SI Isoseismals from Bradley et al (2017) – confidence = 1a

NI Isoseismals estimated by AF8 SDWG – confidence = 2



Secondary Hazards – situation at 8 days

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ALPINE FAULT MAGNITUDE 8

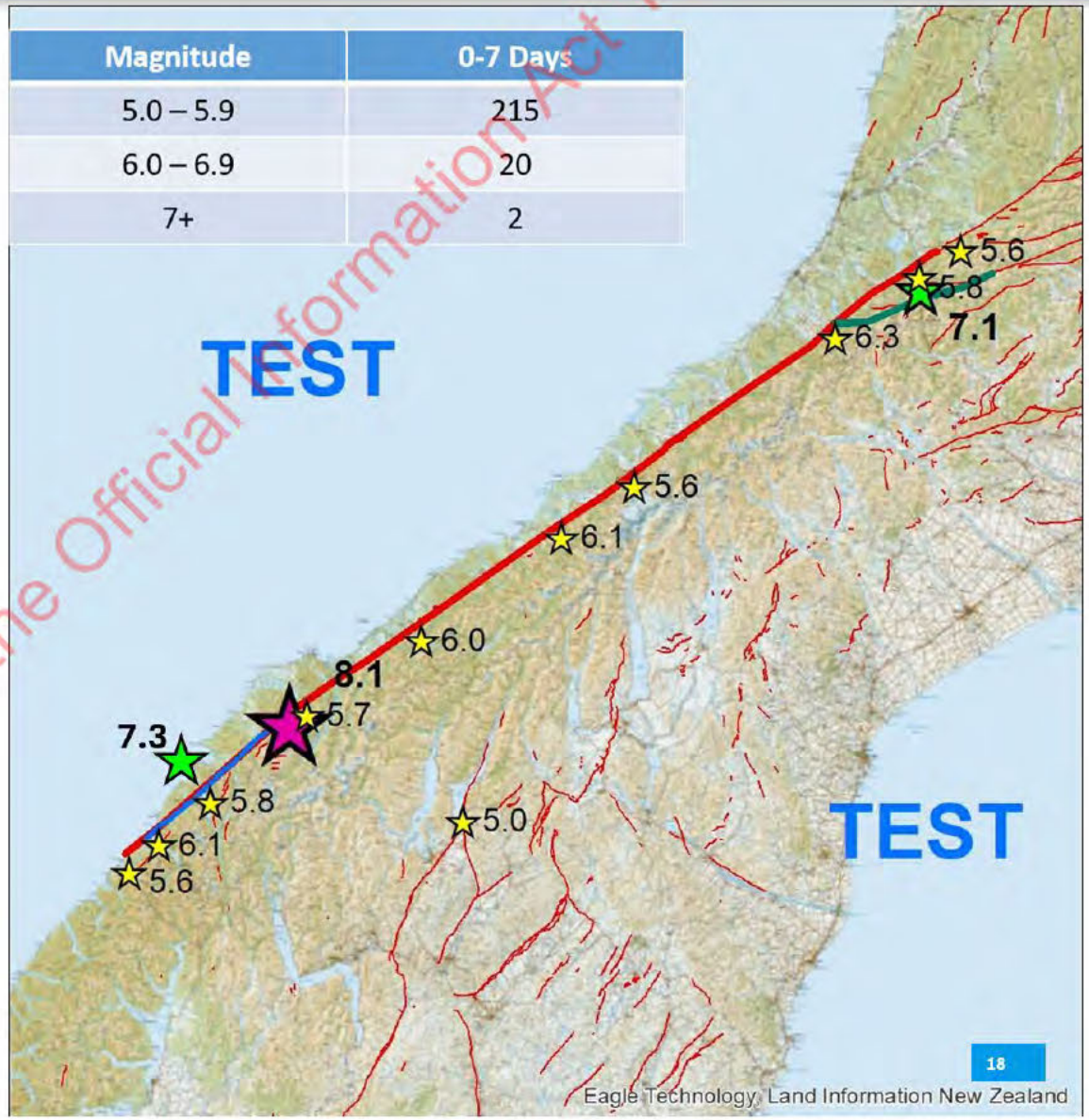
Aftershocks

Most likely at each end of the fault rupture.

Other nearby faults may host major aftershocks due to stress redistribution

- **Day 2 – M7.3 aftershock on the southern Alpine Fault**
- **Day 5 – M5.0 aftershock on Cardrona Fault near Hawea**
- **Day 7 – M7.1 aftershock on southern Hope-Kelly Fault**

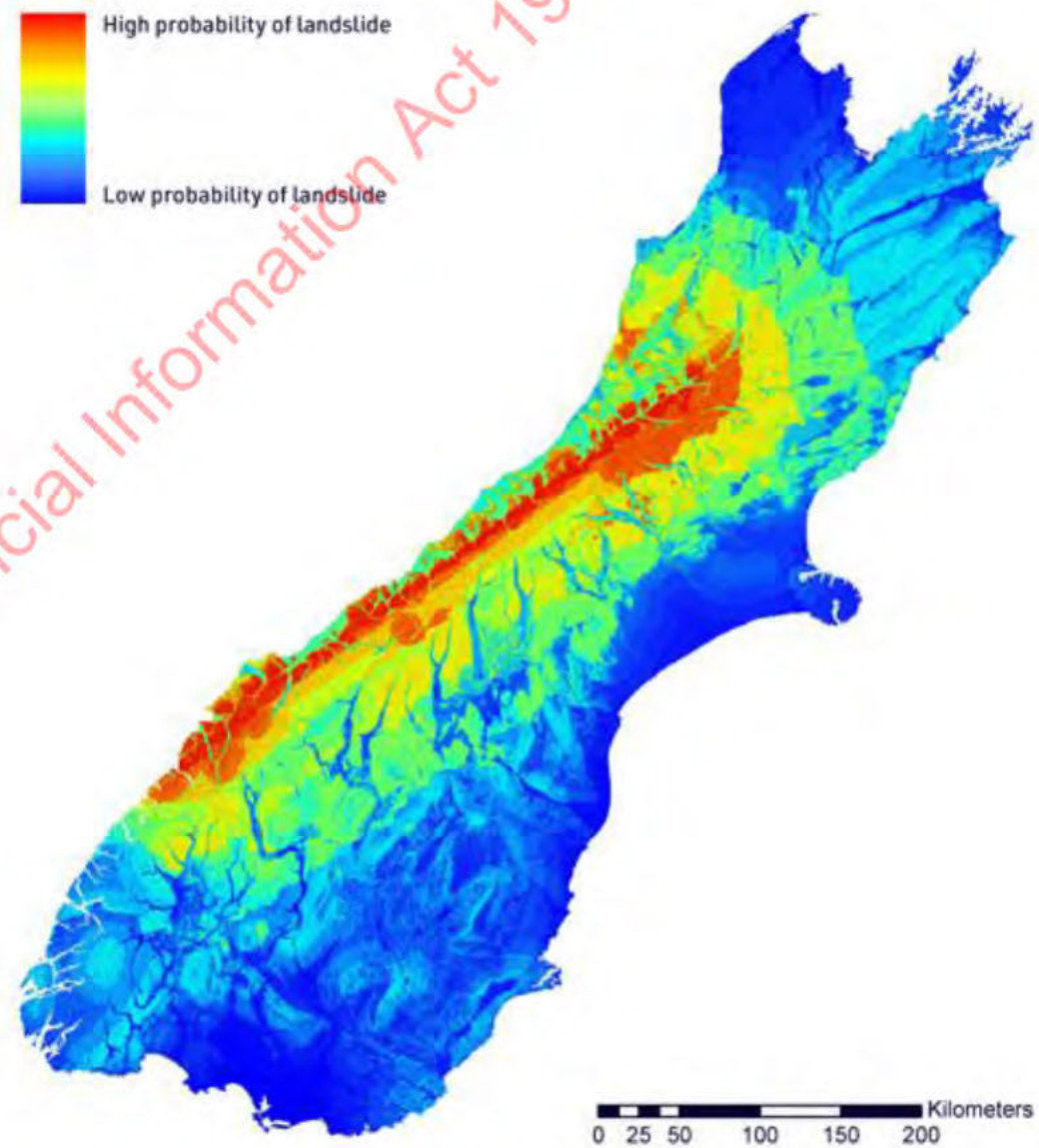
Magnitude	0-7 Days
5.0 – 5.9	215
6.0 – 6.9	20
7+	2



Secondary Hazards – situation at 8 days

Landslide Susceptibility Model

- Model shows relative likelihood of co-seismic landslides
- Densest landslide occurrences in yellow-orange-red
- Est. 80,000 landslides triggered



Adpated from: Robinson et al. (2016)

Casualties

Moderate Injuries	Serious Injuries	Critical Injuries	Deaths
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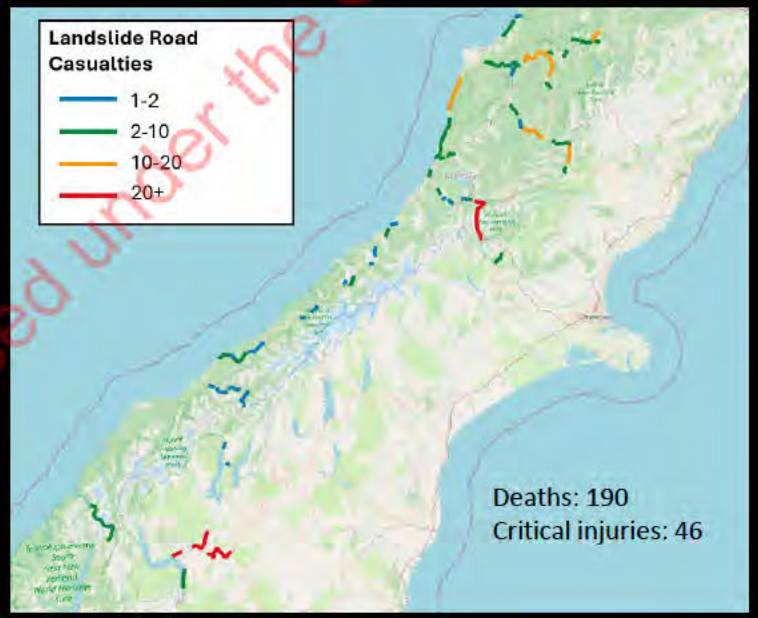

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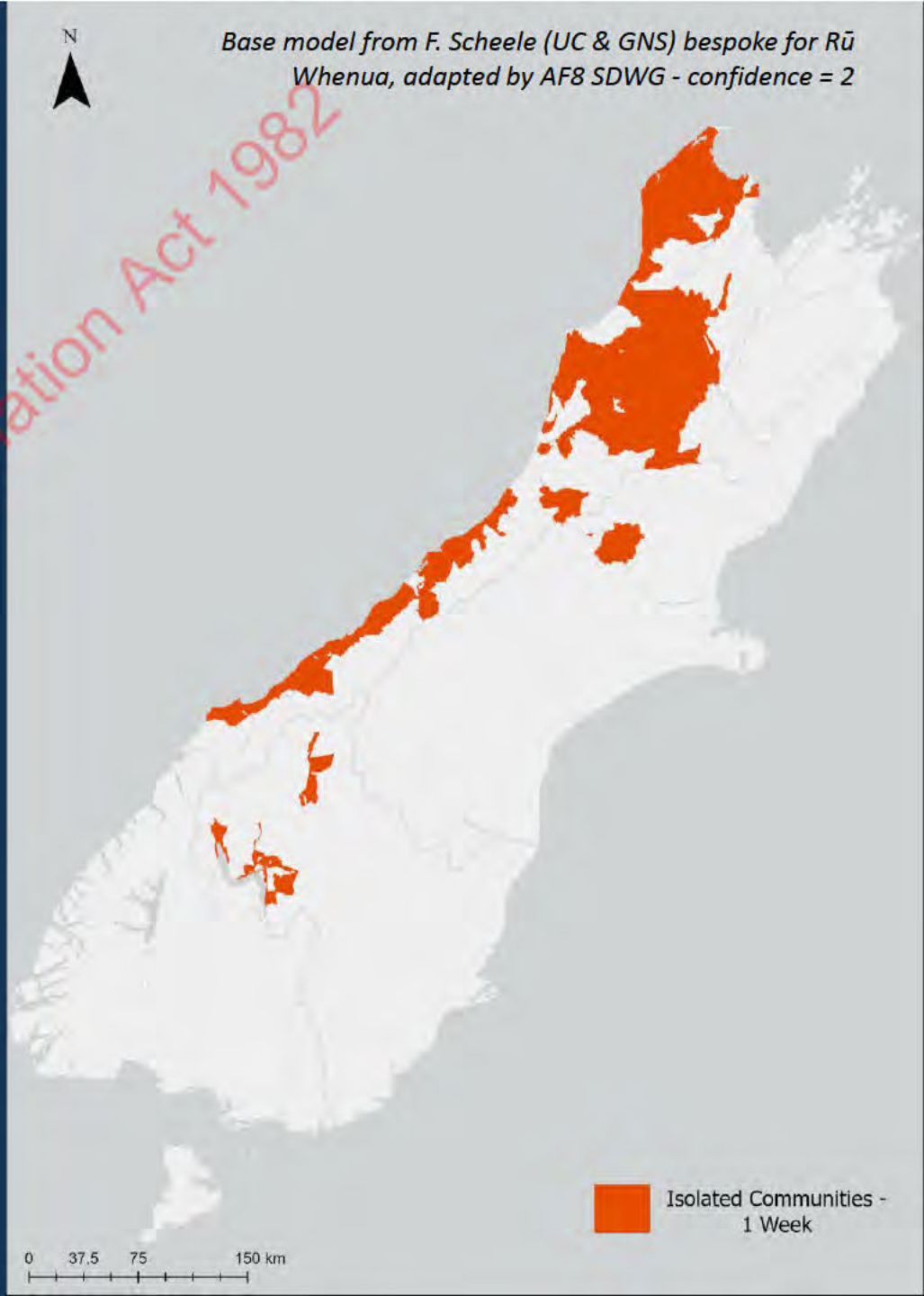
Dunedin City	10	0	0	0
Gore District	0	0	0	0
Grey District	860	154	17	80
Hurunui District	500	60	7	19
Invercargill City	0	0	0	0
Kaikoura District	60	8	1	2
Mackenzie District	30	2	0	0
Marlborough District	340	36	4	9
Nelson City	460	54	6	12
Queenstown-Lakes District	110	6	0	0
Selwyn District	330	36	4	12
Southland District	10	0	0	0
Tasman District	930	107	11	20
Timaru District	990	240	51	193
Waimakariri District	650	102	13	45
Waimate District	20	1	0	0
Waitaki District	20	2	0	1
Westland District	460	63	6	22
Total	9920	1448	197	609

Isolated Communities: Day 7

1b 2

- ~50,000 people isolated
  - ~35,000 in Queenstown area
- Defined as whether each household **is able to access any one of: Hokitika, Greymouth, Westport or Christchurch**
- Shows only isolated SA1 units with non-zero usually resident population
- Access restored to:
  - Mt Cook Village
  - Glentanner
  - Kumara
  - Kumara Junction
- **All other communities isolated on Day 1 remain isolated by road**



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Displaced Communities

- West Coast and Queenstown (~45,000 people) remain disconnected from the State Highway Network. Airfields are open.
- Severe wellbeing concerns for displaced and isolated communities without electricity e.g. West Coast and Queenstown.
- International outrage growing

- Model details:
  - Loss of habitability based on building damage and SH and Power LoS
  - These numbers include only **usually resident population**

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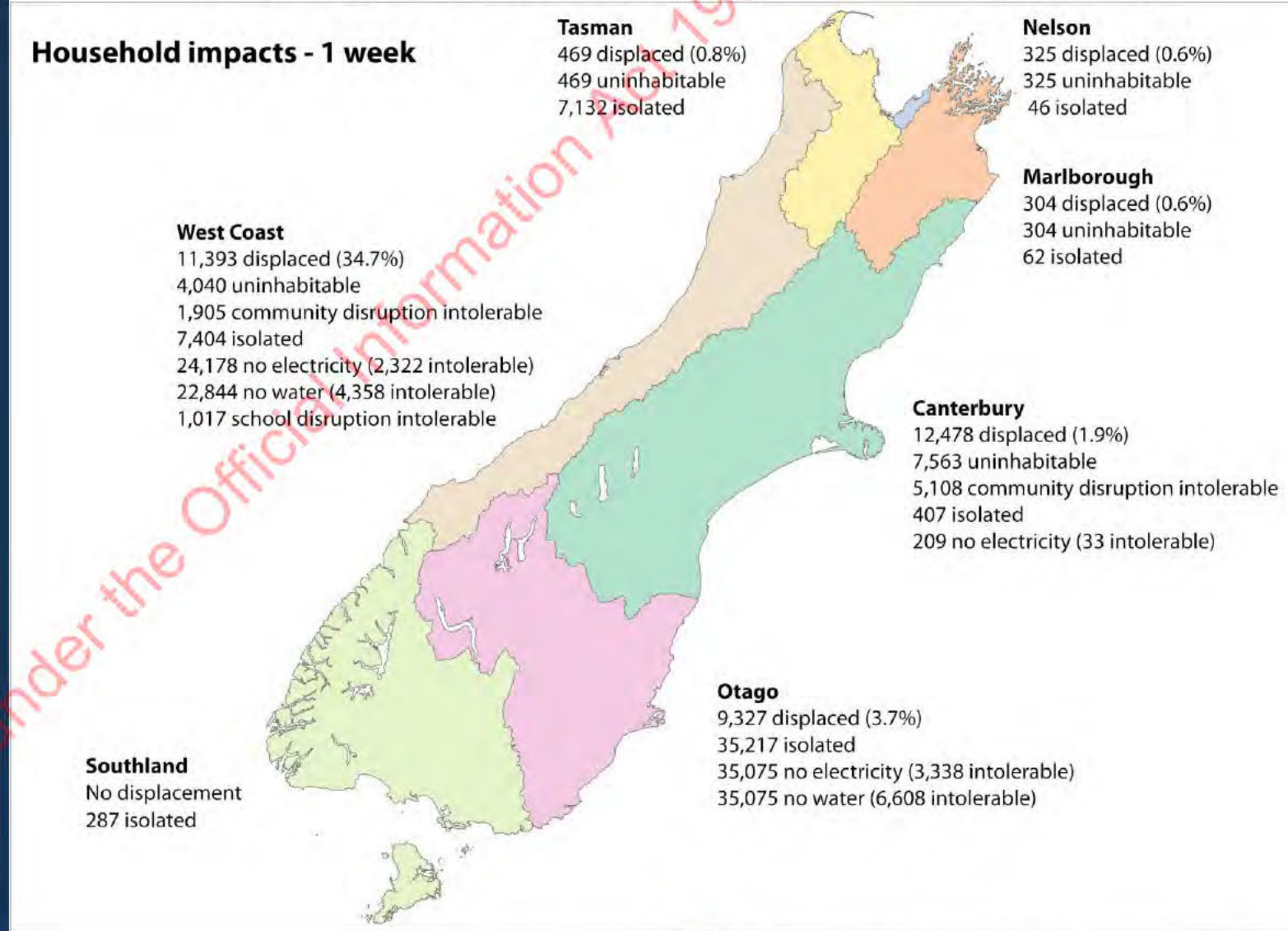
Est. Displaced/Isolated – **Local Pop. Only**



F. Scheele (UC & GNS) bespoke for Rū Whenua

Cascading and Compounding Events A

1. **Major hotel in Queenstown** – partial collapse of East Wing. 15 fatalities; 3 unrecovered bodies. **International outrage growing**

2. **Ski Fields:** Avalanches occurred on various ski fields.

   Several hundred were injured, and thousands were trapped for extended period Final people recently rescued, but **high international outrage**.

   Est. 53 people (28 Australian, 5 Chinese, 20 NZ) are missing on Cardrona ski field - either buried presumed dead, or missing from roll call.

   10 bodies recovered, during search for survivors.

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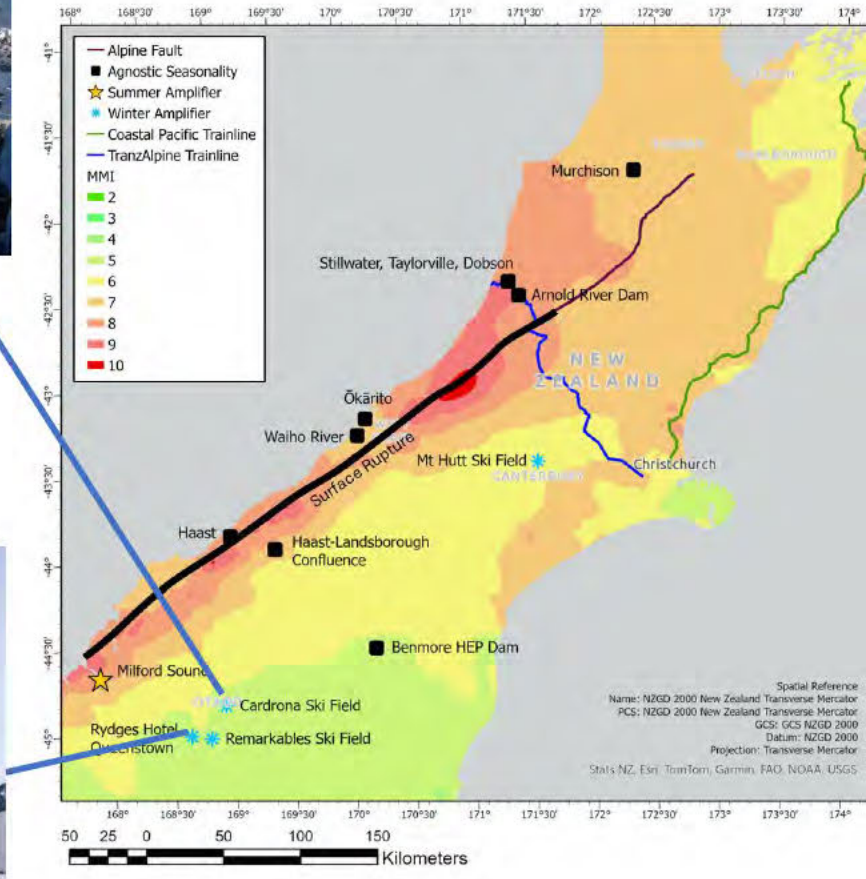

Cascading and Compounding Events B

3. Landslide tsunami at Milford Sound

- Small wave produced
- 15 fatalities; 38 critical injuries

4. Fault rupture through Franz Josef village (8m horizonal; 2 m vertical)

- Numerous FJ residents trying to shelter in complexly damaged buildings.
- Assume evacuation of injured has occurred.
- Fuel storage at helipad site is damage; spilling all aviation fuel.
- Waiho river stopbanks breached, flooding farms (89 people; 189 buildings affected)

5. Localised tsunami at Ōkarito Lagoon

- Tsunami heights estimated at 1.0-2.5 m
- 159 buildings & 80 people affected at Ōkarito.
- 15 critical injuries. Loss of housing, food and water supplies

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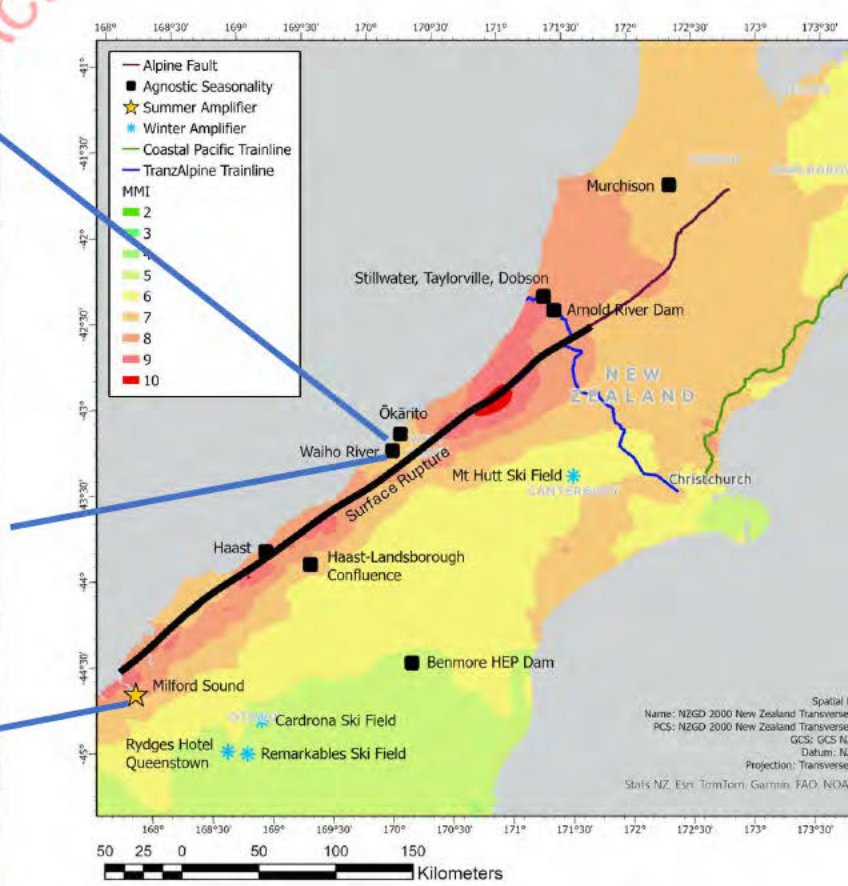
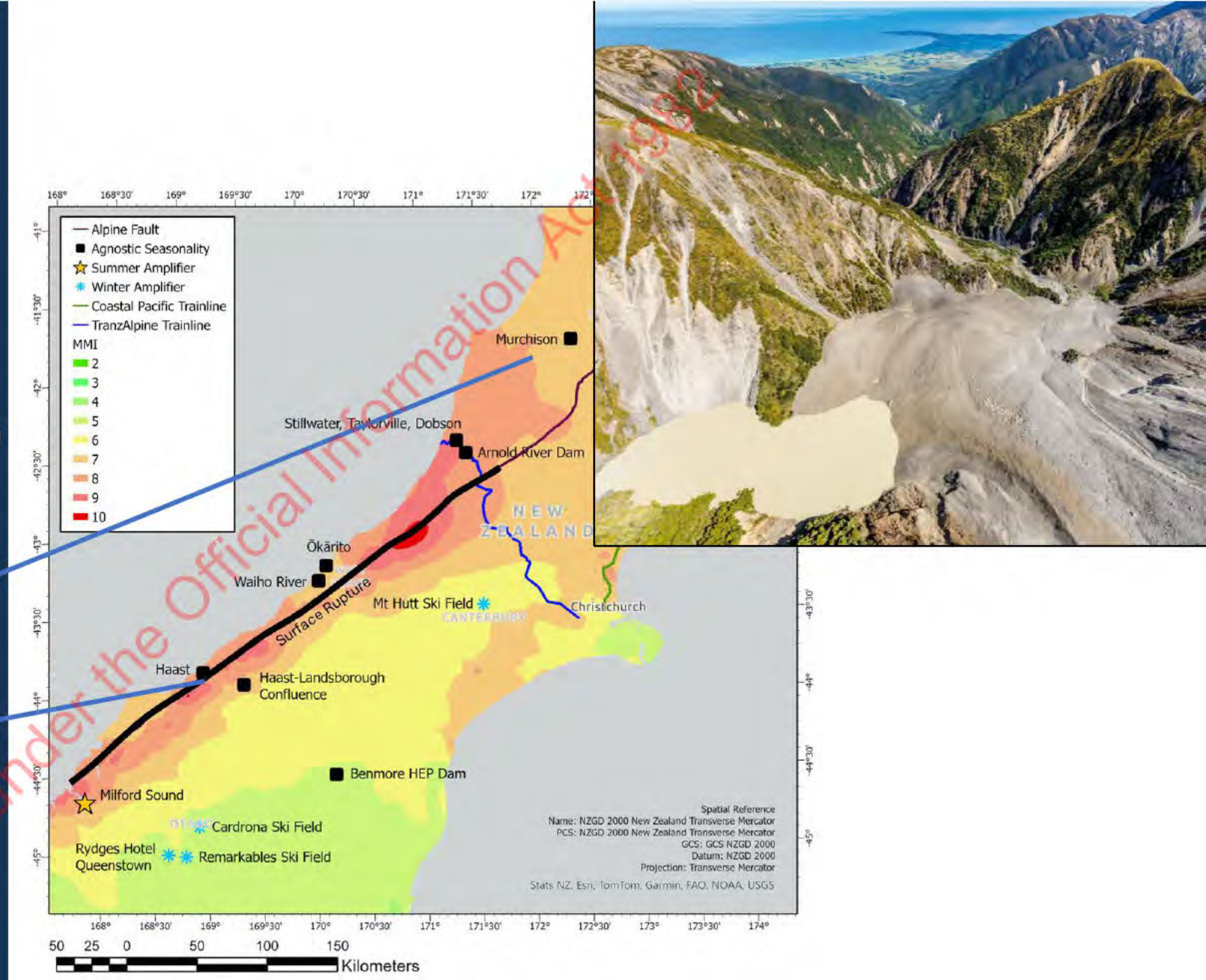


Cascading and Compounding Events C

6. Landslide Dams

- 80,000 landslides are estimated to have occurred, creating hundreds of landslide dams, including several which threaten communities at:
- 20m dam on Matakitaki River upstream of Murchison; 600 people exposed; 5 min flood arrival time
- 50 m dam on Landsborough river, upstream of Haast; 363 people exposed; 60 min flood arrival time



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ALPINE FAULT MAGNITUDE 8

State Highways: level of service

Disruption State
Catastrophic
Extreme
Severe
High
Moderate
Limited
None

Note:

1. Estimates are in days for 4x4 emergency access only.
2. Estimates assume the bridges will be inspected and opened with lane/weight restrictions. However, it is more likely we need to assume 10% of the structures will be closed.
3. Estimates have been taken from the regional Lifeline Group workshops but have been modified to for consistency by the System Resilience Team and TLA. A detailed technical review is required to gain confidence in these estimates.

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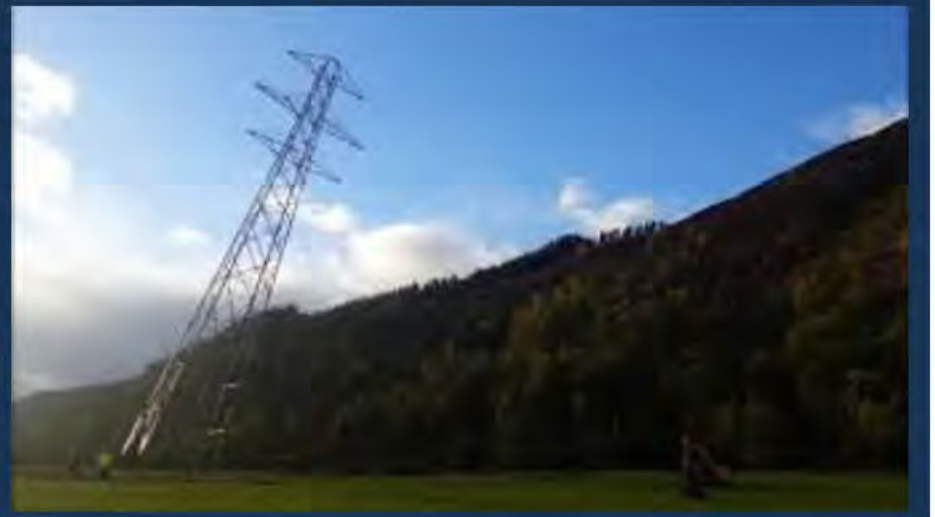
ALPINE FAULT MAGNITUDE 8

Critical Infrastructure Overview at Day 8



Electricity

- West Coast and Queenstown without power
- Map Timeline shows a potential ‘Day 1’ network outages
- Benmore Hydroelectric Dam (current issue)
  - Slumping of dam (15cm) over the past 12 hours
  - Note HVDC link to North Island and ~430 people live in flood plain downstream. Map Timeline shows a potential ‘Day 1’ network outages

Fuel

- Acute shortages of all fuel types across West Coast and Queenstown

Water

- Water insecurity in West Coast and Queenstown due to damage municipal schemes and lack of electricity/fuel

Telecommunications

- Patchy cellular across West Coast and Queenstown. No fibre. Reliant on satellite.

Critical Infrastructure Overview at Day 8

SH1 following 2016 Kaikōura EQ

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Rail

- Trans-Alpine is disrupted throughout Southern Alps (severe land sliding)
- Picton-Chch is open

Airports

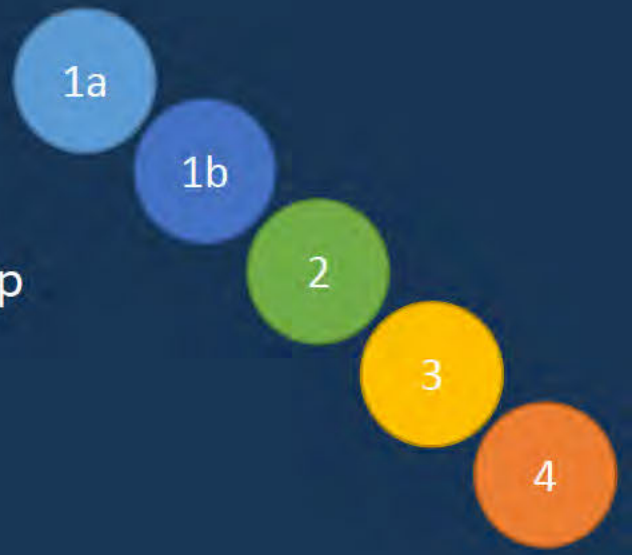
- Haast and Milford not operational
- Westport and Hokitika partially operational
- Remaining airports are operational
- Disruption mostly from loss of services

Ports

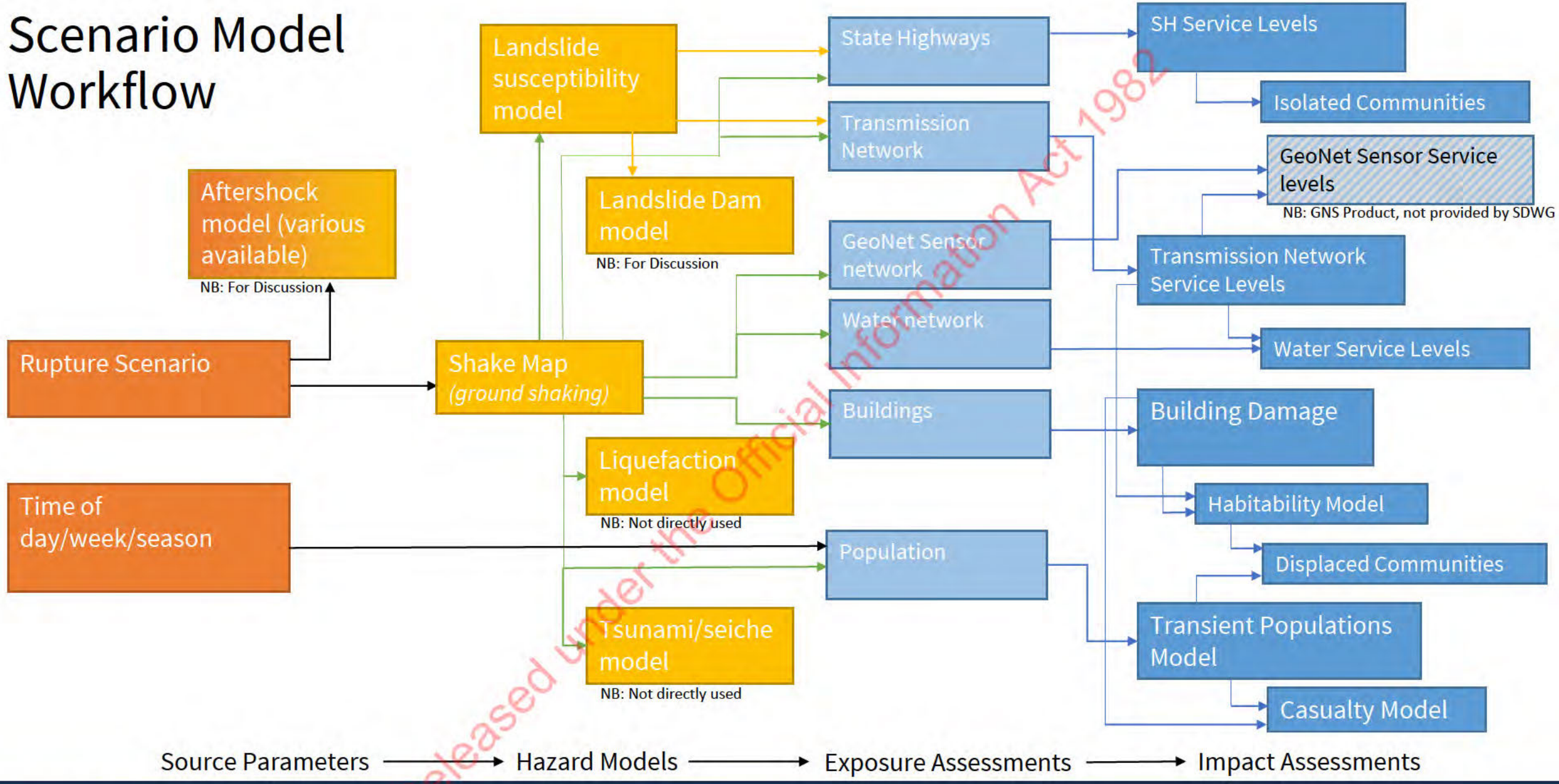
- Nelson, Marlborough, Timaru, Otago, Lyttelton, Bluff & North Island ports operational
- Jacksons Bay, Westport and Greymouth severely impacted, but:
  - Westport now partially operational
  - Greymouth partially operational from day 9
  - Very limited road access to these ports

Scenario Development Methodology

- Lead/coordinated/wrangled by Alice Lake-Hammond, Tom Wilson & Tom Robinson + wider Scenario Development Working Group
- Massive assistance, input and support from wide range of science and EM sector agencies and individuals
- Four tiers of output confidence
  1. Modelled by reputable scientific individual/group
     a. SAFER Framework
     b. Bespoke Work Products for Rū Whenua
  2. Expert judgement by reputable scientific/sector individual/group
     Reviewed and approved by AF8 Scenario Development Working Group
  3. Expert judgement by ExCon
  4. Generated by other entity



Scenario Model Workflow



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ALPINE FAULT MAGNITUDE 8

www.af8.org.nz

@AlpineFault8

EMERGENCY MANAGEMENT SOUTHLAND
Te Rākau Whakamarumaru Murihiku

Emergency Management Canterbury

Emergency Management Otago
Te Rākau Whakamarumaru Ōtākou

WEST COAST EMERGENCY MANAGEMENT GROUP

NELSON TASMAN EMERGENCY MANAGEMENT GROUP

Marlborough Emergency Management GROUP

Toka Tū Ake EQC

RESILIENCE TO NATURE'S CHALLENGES
Kia manawaroa – Ngā Ākina o Te Ao Tūroa

National SCIENCE Challenges

QuakeCoRE
NZ Centre for Earthquake Resilience
Te Hiranga Rū

GNS SCIENCE TE PŪ AO

National Emergency Management Agency
Te Rākau Whakamarumaru

UNIVERSITY of OTAGO
Te Whare Wānanga o Otāgo
NEW ZEALAND

UC UNIVERSITY OF CANTERBURY
Te Whare Wānanga o Waitaha
CHRISTCHURCH NEW ZEALAND

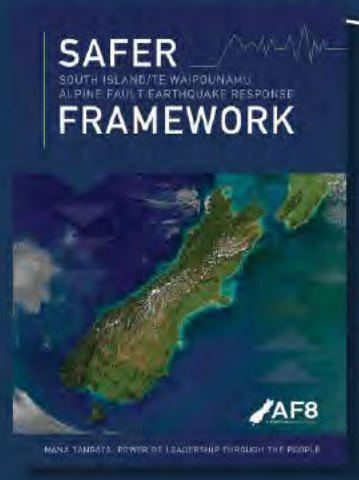
THE UNIVERSITY OF AUCKLAND
Te Whare Wānanga o Tāmaki Makaurau
NEW ZEALAND

TE HERENGA WAKA
WELLINGTON
VICTORIA UNIVERSITY OF WELLINGTON

Key messages

- Next Alpine Fault earthquake is inevitable and there is a high chance it will be a magnitude 8
- 'Scenario earthquakes' never quite what is experienced
- Direct and indirect Impacts across the South Island and the lower North Island
- Widespread secondary hazards (e.g. landslides) will present immediate and long-term issues
- Casualties are likely – highly dependent on time of year and time of day
- Likely isolation of areas for long periods of time, and extended critical infrastructure service outages
- We can't predict earthquakes but we can prepare for them – we all have a part to play
- Anything we do now will make a difference, for any significant future event

Ex. Rū Whenua ‘Day 3’: a recovery scenario



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exercise rū whenua

NATIONAL EXERCISE PROGRAMME
INTERAGENCY CAPABILITY BUILDING

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ALPINE FAULT MAGNITUDE 8

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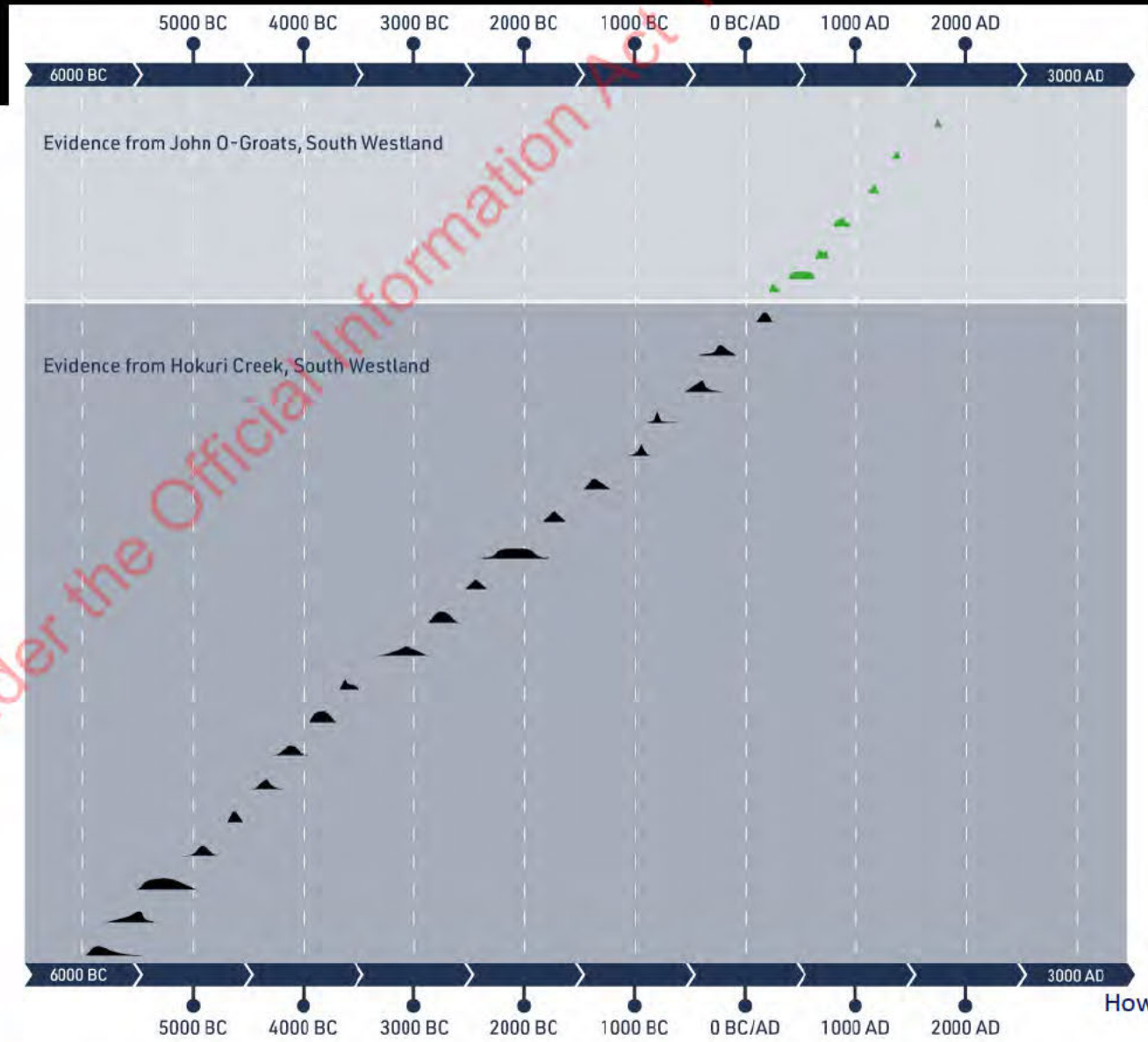

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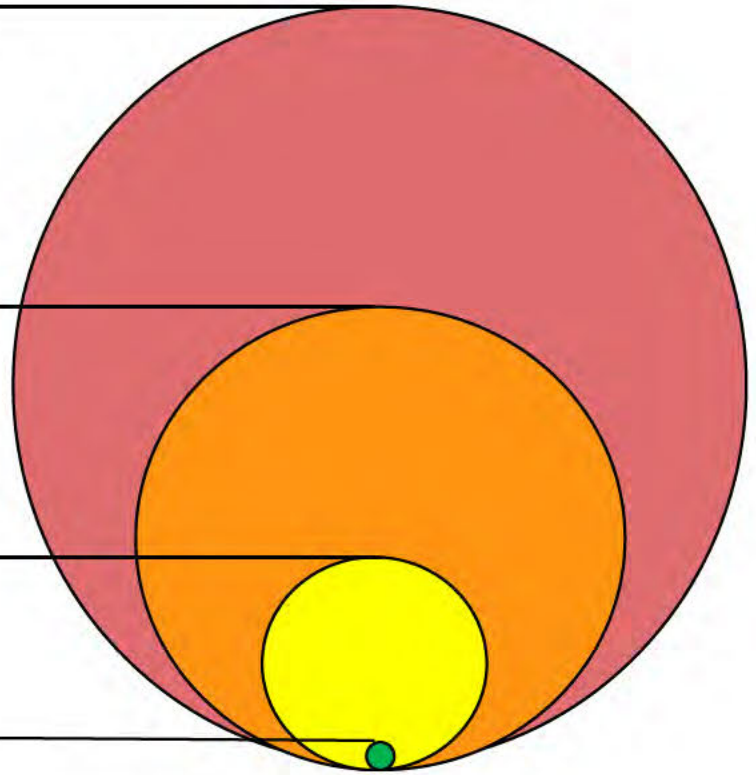

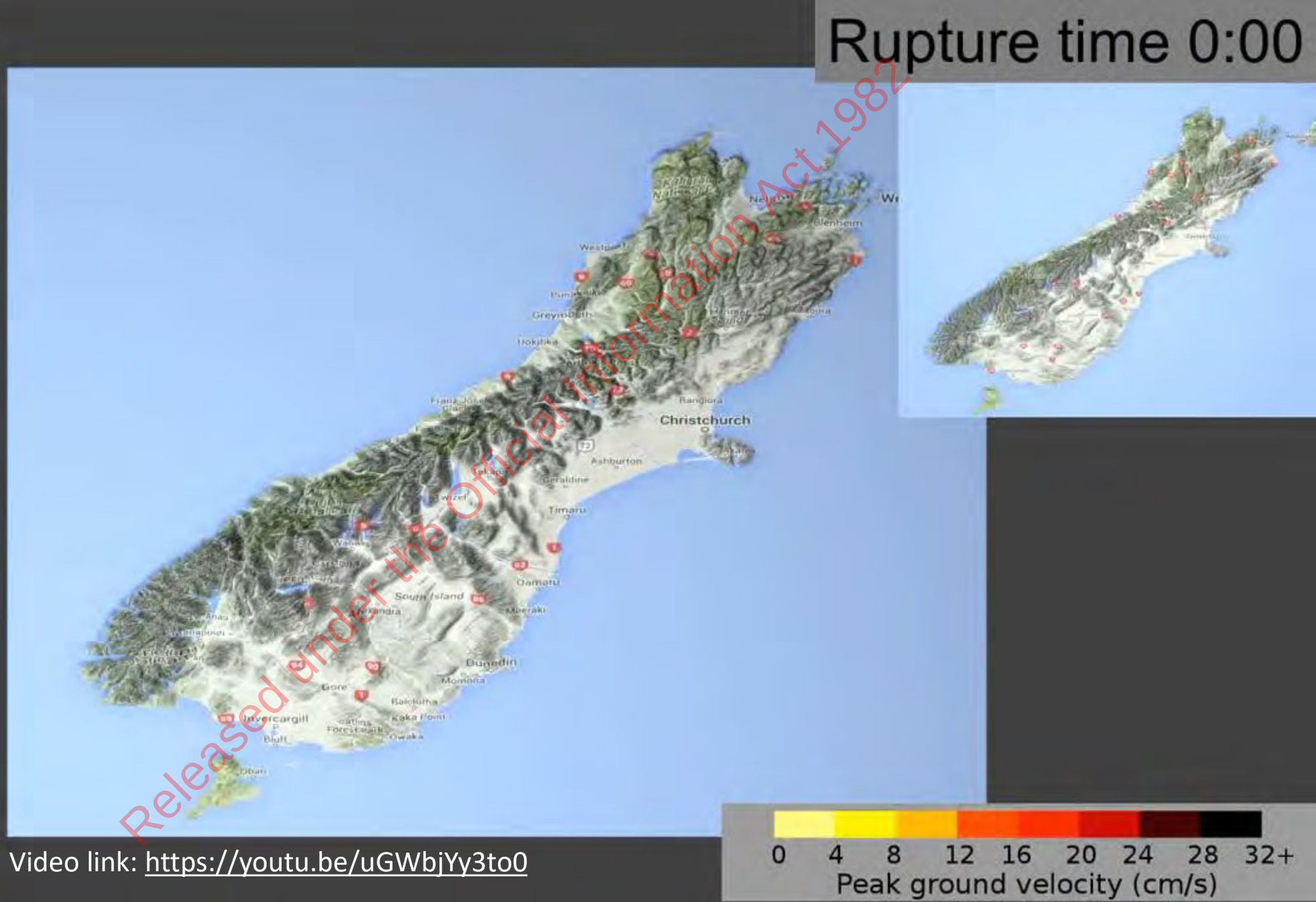

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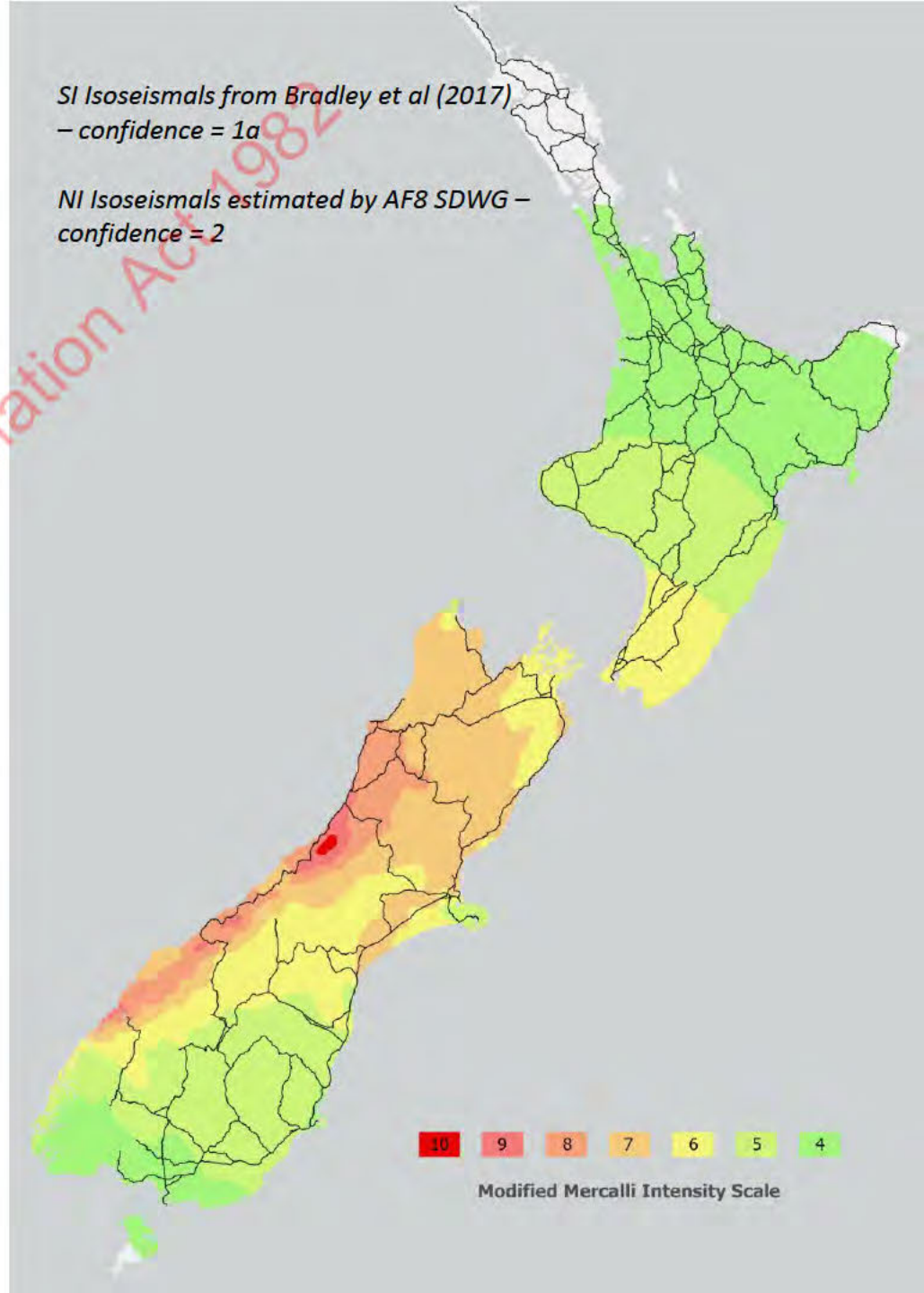

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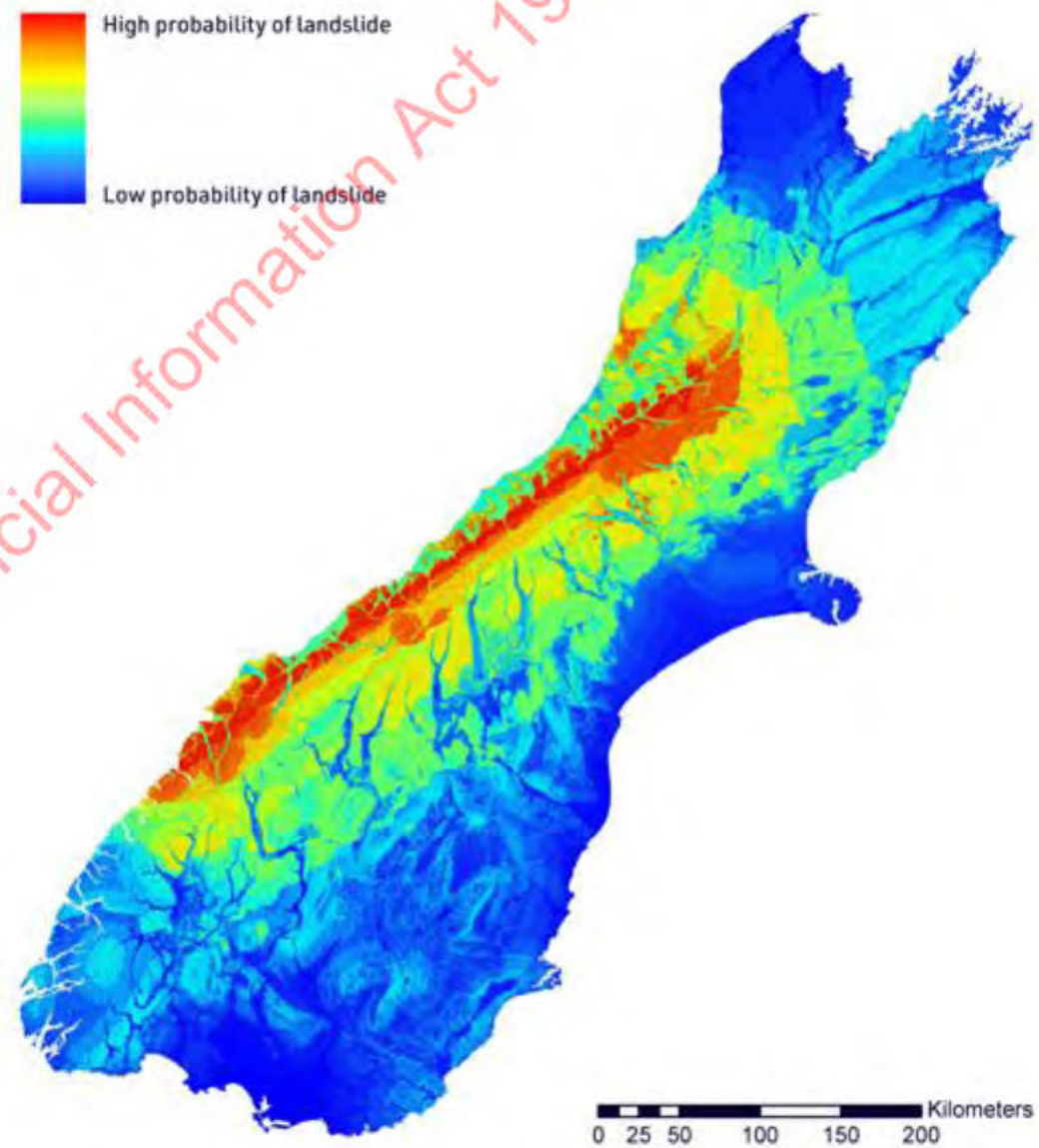

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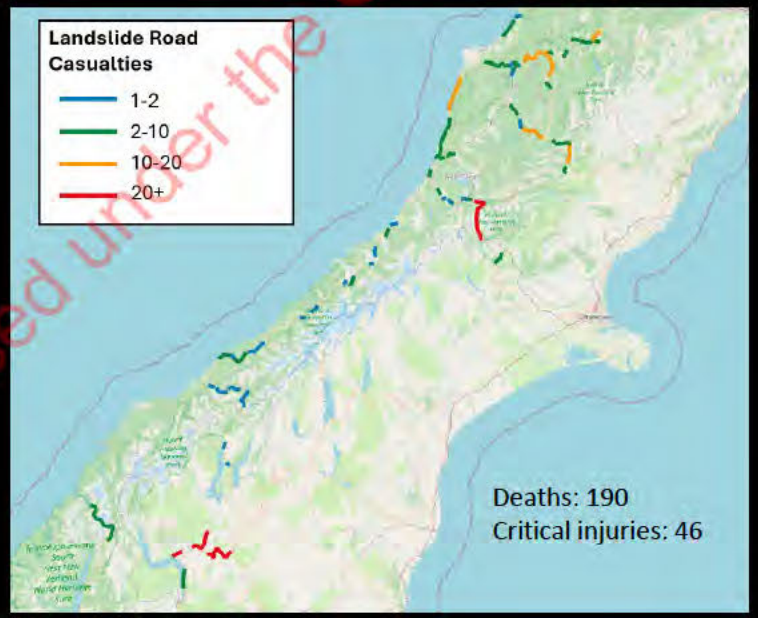

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Grey District	860	154	17	80
Hurunui District	500	60	7	19
Invercargill City	0	0	0	0
Kaikoura District	60	8	1	2
Mackenzie District	30	2	0	0
Marlborough District	340	36	4	9
Nelson City	460	54	6	12
Queenstown-Lakes District	110	6	0	0
Selwyn District	330	36	4	12
Southland District	10	0	0	0
Tasman District	930	107	11	20
Timaru District	990	240	51	193
Waimakariri District	650	102	13	45
Waimate District	20	1	0	0
Waitaki District	20	2	0	1
Westland District	460	63	6	22
Total	9920	1448	197	609

Community Impacts (modelled)

- West Coast and Queenstown (~40,000 people) remain disconnected from the State Highway Network.

- ~27,000 displaced people
  - West Coast (13,000)
  - Canterbury (12,000)

  Defined as whether each household is able to access any one of: Hokitika, Greymouth, Westport or Christchurch

- West Coast – essential service disruption
  - >15,00 no water (mostly towns)
  - >6,500 no electricity

- Model details:
  - Loss of habitability based on building damage and SH and Power LoS
  - These numbers include only **usually resident population**

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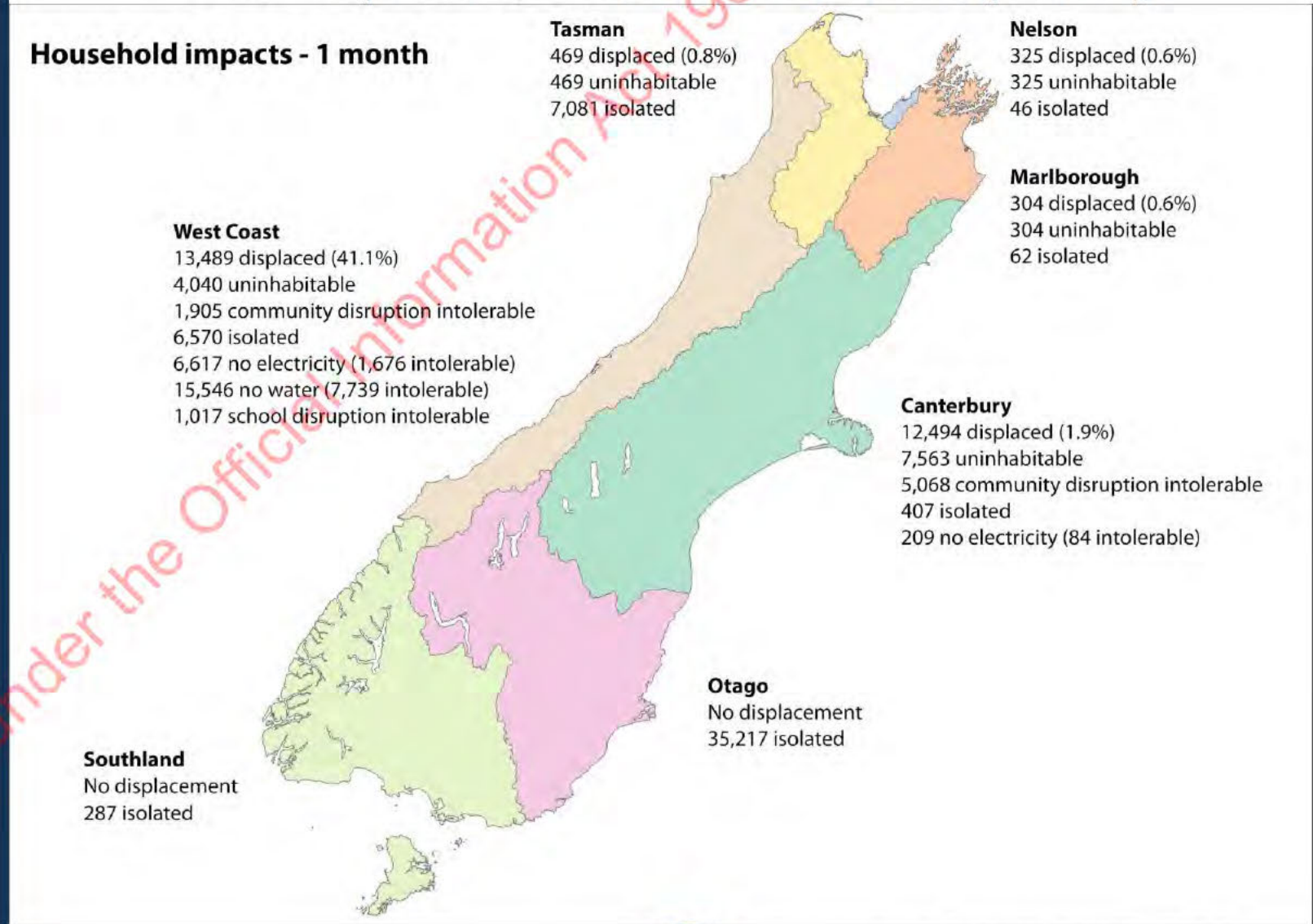
Est. Displaced/Isolated – **Local Pop. Only**



F. Scheele (UC & GNS) bespoke for Ex. Rū Whenua

Population Displacement (AESAP Social Science Panel)

Initial

- >400,000 evacuated

24 hours

- >100,000 still evacuated
- Critical need: welfare support, city cordons, comms guidance on evac zones & ongoing aftershock risk
- International response support will be critical

1 Week

- Large scale relocations occurring, where possible
- Rural communities begin to need (more) assistance
- International response support will be critical

6 weeks

- Potential public frustration with perceived inadequate support and action
- Media come into play strongly
- Psychosocial impacts need to be considered
- Populations facing vulnerabilities will need additional support (e.g. migrant communities with no support networks)

GENERAL: Displacements are generally highly contextual

- If feeling safe and welfare needs being met, people generally will want to stay
- **Push**: Ongoing perceived threat to life and wellbeing (e.g. aftershocks, tsunami, etc.)
- **Pull**: Availability of other options (e.g. second home, relatives/friends who can receive…)

State Highways: level of service 2 weeks

Disruption State
Catastrophic
Extreme
Severe
High
Moderate
Limited
None

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Note:

1. Estimates are in days for 4x4 emergency access only.
2. Estimates assume the bridges will be inspected and opened with lane/weight restrictions. However, it is more likely we need to assume 10% of the structures will be closed.
3. Estimates have been taken from the regional Lifeline Group workshops but have been modified to for consistency by the System Resilience Team and TLA. A detailed technical review is required to gain confidence in these estimates.

Critical Infrastructure Overview: **6 weeks**

SH1 following 2016 Kaikōura EQ

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Buildings

- estimated $12.5 billion in damage (residential, commercial, government, etc.)

Energy

- ~20% of West Coast population still without electricity
- Acute shortages of all fuel types across West Coast and Queenstown

Water

- Water insecurity in West Coast and Queenstown due to damage municipal schemes and lack of electricity/fuel

Airports

- Haast and Milford not operational
- Westport and Hokitika partially operational
- Other airports are operational

Ports

- Jacksons Bay not operational
- Westport and Greymouth partially operational
- Other ports are operational

Telecommunications

- Patchy cellular across West Coast and Queenstown. No fibre. Reliant on satellite.

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www.af8.org.nz

@AlpineFault8

EMERGENCY MANAGEMENT SOUTHLAND
Te Rākau Whakamarumaru Murihiku

Emergency Management Canterbury

Emergency Management Otago
Te Rākau Whakamarumaru Ōtākou

WEST COAST EMERGENCY MANAGEMENT GROUP

NELSON TASMAN EMERGENCY MANAGEMENT GROUP

Marlborough Emergency Management GROUP

Toka Tū Ake EQC

RESILIENCE TO NATURE'S CHALLENGES
Kia manawaroa – Ngā Ākina o Te Ao Tūroa

National Science Challenges

QuakeCoRE
NZ Centre for Earthquake Resilience
Te Hiranga Rū

GNS SCIENCE TE PŪ AO

National Emergency Management Agency
Te Rākau Whakamarumaru

UNIVERSITY of OTAGO
Te Whare Wānanga o Otāgo
NEW ZEALAND

UC UNIVERSITY OF CANTERBURY
Te Whare Wānanga o Waitaha
CHRISTCHURCH NEW ZEALAND

THE UNIVERSITY OF AUCKLAND
Te Whare Wānanga o Tāmaki Makaurau
NEW ZEALAND

TE HERENGA WAKA
WELLINGTON
VICTORIA UNIVERSITY OF WELLINGTON

Key messages

- Next Alpine Fault earthquake is inevitable and there is a high chance it will be a magnitude 8
- 'Scenario earthquakes' never quite what is experienced
- Direct and indirect Impacts across the South Island and the lower North Island
- Widespread secondary hazards (e.g. landslides) will present immediate and long-term issues
- Casualties are likely – highly dependent on time of year and time of day
- Likely isolation of areas for long periods of time, and extended critical infrastructure service outages
- We can't predict earthquakes but we can prepare for them – we all have a part to play
- Anything we do now will make a difference, for any significant future event

Cover Sheet for HRB/SIB Item 2

Meeting Date	19 October 2022
Sponsoring Agency	NEMA
Item Title	Catastrophic event readiness

Purpose

1. This item progresses recent discussions at HRB/SIB; Public Service Leadership Team; and Officials Priorities Committee in relation to New Zealand's readiness for a catastrophic event. It sets out, and seeks support for, the work underway and provides an update on the alternative National Crisis Management Centre (NCMC) initiative.

Recommendations

2. It is recommended that HRB/SIB:

   a. ***Note*** that the identification and training of an Auckland-based contingent workforce for the alternative National Crisis Management Centre (NCMC) is progressing and progress will be included in a December report back to Cabinet;

   b. ***Agree*** to support the multi-agency five-day activity from 14-18 November that will develop a Catastrophic Event plan based on a Hikurangi subduction earthquake and tsunami;

   c. ***Note*** that NEMA has commenced work on a detailed business case for an alternative NCMC and that the preferred location and operating model will be decided by Cabinet in early 2023;

   d. ***Confirm,*** by 30 April 2023, that their respective agency response and business continuity arrangements are pragmatic for a catastrophic event including one that impacts Wellington;

   e. ***Note*** that Cabinet has asked for a report back by the end of the year on a review of the Emergency Relocation of Executive Government and Parliament plan;

   f. ***Agree*** to support, as is relevant, the revision of the parliamentary/ministerial plan for continuity of services following a disruptive Wellington event.

Papers accompanying this cover sheet

Item 2B Catastrophic Event Readiness

Contacts

3. Sarah Holland sarah.holland@nema.govt.nz s9(2)(a)

Peter Murray Peter.Murray@nema.govt.nz s9(2)(a)

19 October 2022

Members
Hazard Risk Board and Security and Intelligence Board

Catastrophic Event Readiness

Purpose

1. NEMA has responded to recent Chief Executive discussions regarding New Zealand's readiness for a catastrophic event by stepping up its system stewardship as well as lead agency role. This paper sets out and seeks support for the work underway and provides an update on the alternative National Crisis Management Centre (NCMC) initiative.

Any catastrophic event, but especially one affecting Wellington, will be extremely challenging

2. New Zealand is susceptible to a number of hazards that could cause a catastrophic event including, but not limited to, ruptures of the Hikurangi or Alpine Faults, or a major volcanic eruption.

3. A catastrophic event[1] is characterised by extremely large physical and social impacts on thousands of people across multiple regions; displaces large numbers of people for extended periods of time, if not permanently; causes widespread devastation across multiple regions, including significant damage to buildings and infrastructure; requires support from major national and international resources; overwhelms the capacity of local and national organisations; and presents massive challenges to recovery.

4. New Zealand response agencies have experience in managing emergencies and some experience in managing disasters, but no experience in managing catastrophic events.

5. Whilst a catastrophic event affecting any part of New Zealand will be difficult, one that impacts Wellington will be particularly challenging. In addition to its economic importance, and role as a key transportation hub, Wellington's position as the seat of government will impact the ability of authorities to coordinate and control the response.

6. In August 2022 Cabinet[2] directed NEMA to commence a detailed business case for an alternative NCMC and directed "relevant agencies to engage with NEMA to… advance interagency workforce development as a matter of priority." It also "invited the Minister for Emergency Management to report back on a review of the existing parliamentary / ministerial plan."

7. This paper covers the following components:

   a. Contingent workforce;
   b. Catastrophic event planning;
   c. National Crisis Management Centre (facility for central leadership and coordination);
   d. Business continuity: ability to function following a disruptive event.

[1] Based on Rapid Disaster Relief: Responding to people's needs in a catastrophe - how would New Zealand cope, Hawkes Bay CDEM Group link
[2] CAB-22-MIN-0342

Alternative National Crisis Management Centre contingent workforce (located outside Wellington)

8. Appendix 1 shows the composition of the required contingent workforce for the alternative NCMC which is currently tagged to the Ellerslie Event Centre, Auckland. The workforce supply and capability requirements will be informed by upcoming scenario-based planning.

9. Following a request by CE NEMA to the Public Sector Leadership Team, agencies have responded quickly to progress the identification of staff based in the Auckland area who will be available to work in the alternative NCMC.

10. 36 agencies[3] (out of 44) have responded with points of contact; follow up meetings have already been held with 20 agencies. Whilst numbers and suitability of staff have not yet been confirmed by agencies, the attitude has been 'how can we help?' Nominations for an Auckland-based senior leadership group, which will oversee the development of the Auckland contingent workforce, have been received. Terms of reference and final membership details are currently being developed.

11. Agencies have indicated they will work with NEMA on staff capability development; this is recognised as being of joint value to uplift crisis management capabilities. A sustainable approach requires key agencies (typically those that are also lead agencies) to deliver Coordinated Incident Management System (CIMS) core and function team level emergency management training.

12. NEMA will have a suite of training and assessment packages for all the CIMS functions by June 2023 and an Incident Management Team leadership training and exercising package ready by March 2023.

13. At present, identifying an Auckland-based contingent NCMC workforce is going to plan. Progress will be included in a December report back to Cabinet. (Note – we are carrying a risk until this contingent workforce is in place.)

Catastrophic event plan (operational response)

14. From 14-18 November 2022, NEMA will be running a multi-agency five-day activity to develop a plan for a catastrophic event impacting New Zealand. Based on a Hikurangi subduction zone earthquake and tsunami, it will include operationalising the Wellington Earthquake National Initial Response Plan (WENIRP).

15. The activity is designed to produce an operational plan so that NEMA and agencies are clear on not just their obligations (as included in the Civil Defence Emergency Management Act 2002; Guide to the National Civil Defence Emergency Management Plan 2015; Wellington Earthquake National Initial Response Plan; and own statutory responsibilities), but also understand **how** they may deliver on these.

16. The realism of the Catastrophic Event plan will depend on the right people from agencies being involved[4].

17. It is anticipated that CEs will be given an opportunity to interrogate the Catastrophic Event plan; confirm that expectations on their agencies are realistic; and inform NEMA's system assurance considerations (is readiness appropriate / what else should be done?) Whist the

[3] As at 4 Oct 2022

[4] Invitations will be sent out prior to HRB/SIB meeting

appropriate form and date is open to discussion, it is proposed to leverage the next HRB meeting (8 December).

18. The catastrophic planning activity will inform the alternative National Crisis Management Centre initiative (eg workforce, operating model, and facility considerations).

Alternative National Crisis Management Centre Facility (outside Wellington)

19. Since the last HRB/SIB meeting, Cabinet has endorsed the indicative business case for an alternative NCMC facility and directed NEMA to commence the detailed business case. This includes facilities for a small group of Ministers, key advisors and support staff.

20. A decision on the preferred operating model and location will be sought from Cabinet in February / March 2023. Appendix B contains a summary of the six options under consideration.

21. Completion of the Detailed Business Case, including detailed design and engineering services, is reliant on funding being allocated in Budget '23. The intention is for a fully costed bid to be considered for Budget '24; if this is supported, a new alternative NCMC facility (Crown owned or commercial long-term tenancy) can be expected to be completed by mid-2026.

22. Given that this is almost four years away, it is important to lift the current arrangements. In addition to developing the contingent workforce as discussed earlier, there is a need to increase capability of the current Auckland alternative NCMC which is based in the Ellerslie Event Centre[5]. This capability increase (at a minimal level) is included in the aNCMC initiative.

23. A separate initiative, led by Parliamentary Services, is looking at a new primary NCMC within the proposed Museum Street Members' Building, scheduled for completion in 2025/26. The current primary NCMC, located under the Beehive, is not considered fit-for-purpose.

Ability to function after a disruptive event - business continuity

24. A successful response to a catastrophic event will rely on agencies not just being able to perform their critical functions, including their response functions, but also being in a position to support system activity. Being able to do this following a disruptive event requires sound business continuity management (in advance of the event).

25. To support CEs to ensure their respective business continuity arrangements have taken into account relevant impacts, NEMA will share the Hikurangi subduction earthquake and tsunami scenario, high-level impacts, and the national catastrophic event plan with agencies. To ensure momentum of the catastrophic event readiness continues, NEMA proposes seeking confirmation from agencies that their response-related plans, and their business continuity plans are adequate. Advice on the timeframe for this will be sought at HRB/SIB; as an indication, a four-month period is proposed – ie by 30 April 2023.

ODESC

26. DPMC has commenced work to ensure that alternative-ODESC arrangements are fit-for-purpose and known to those involved.

[5] The Auckland Alternative NCMC was discussed at the last HRB/SIB. It is a cold-start facility based in the Ellerslie Event Centre and is not fit-for-purpose. An on-site 'cage' contains 80 laptops and basic coordination centre equipment.

Ministers and Parliament

27. The plan for the "Emergency Relocation of Executive Government and Parliament following a Major Wellington Earthquake" was confirmed by Cabinet, following Ex RANGATIRA[6], in 2014. It identifies the Devonport Naval Base as the interim relocation facility.

28. Cabinet has invited[7] the Minster for Emergency Management to report back with a review of this plan, which is owned by Parliamentary Services. Cabinet also directed DPMC and DIA to engage with NEMA and Parliamentary Services to ensure the broader alternative NCMC work is aligned with emergency management plans for ministers and Parliament.

29. NEMA commenced discussions with DPMC, DIA and Parliamentary Services on 12 October. Refreshing the plan may require a focussed effort; it will need to remain viable until long-term alternative NCMC options are in place.

Recommendations

30. It is recommended that HRB/SIB:

    a. ***Note*** that the identification and training of an Auckland-based contingent workforce for the alternative National Crisis Management Centre (NCMC) is progressing and progress will be included in a December report back to Cabinet;

    b. ***Agree*** to support the multi-agency five-day activity from 14-18 November that will develop a Catastrophic Event plan based on a Hikurangi subduction earthquake and tsunami;

    c. ***Note*** that NEMA has commenced work on a detailed business case for an alternative NCMC and that the preferred location and operating model will be decided by Cabinet in early 2023;

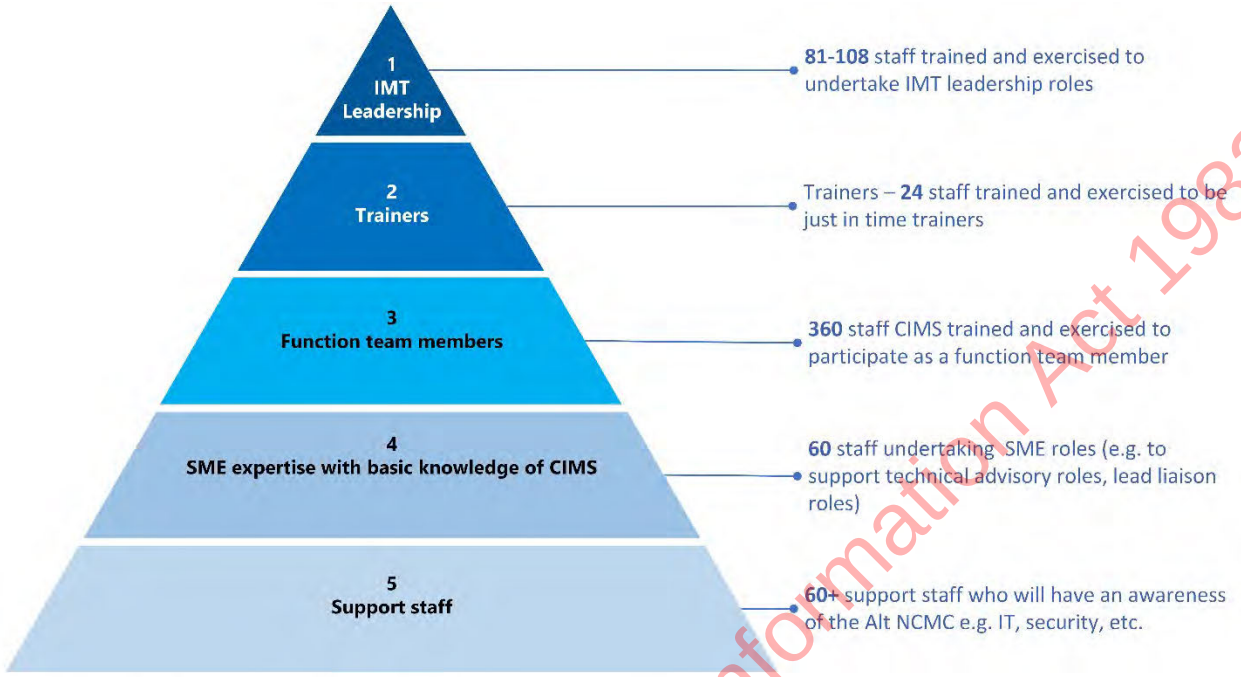
    d. ***Confirm,*** by 30 April 2023, that their respective agency response and business continuity arrangements are pragmatic for a catastrophic event including one that impacts Wellington;

    e. ***Note*** that Cabinet has asked for a report back by the end of the year on a review of the Emergency Relocation of Executive Government and Parliament plan;

    a. ***Agree*** to support, as is relevant, the revision of the parliamentary/ministerial plan for continuity of services following a disruptive Wellington event.

[6] Ex RANGATIRA critically reviewed the Emergency Relocation of Executive Government and Parliament Pan and involved Ministers and key officials with roles defined in the plan. It took place April-May2014.
[7] CAB-22-MIN-0342

Appendix 1: Alternative NCMC workforce model (based on 3 x shifts)



Total Cohort: 612 plus backups for non-availability.

Noting that workforce numbers will be refined as the operating model is finalised.

IMT Incident Management Team

CIMS Coordinated Incident Management System.

Appendix 2: Six options for the (new) alternative National Crisis Management Centre

Key: Cold start	Basic readiness	Recommended readiness

A. Status quo (counterfactual) *Auckland*	Existing facility at Ellerslie Racecourse. No additional investment.
B. Status quo with limited remediation *Auckland*	Facility at Ellerslie Racecourse with remediation efforts to address physical building needs. Additional investment in training public servants.
C. Third-party facility *Auckland*	An existing large-scale private facility (e.g. convention centre) in the CBD is pre-positioned as a NCMC, with access to onsite accommodation and facilities to support Ministers.
D. Integrated or distributed facility *Manawatū*	Two operating model options: • *Integrated* – purpose-built facility with all services on one site. An integrated design, build and maintenance contract is used to minimise operational costs. • *Distributed* – a purpose-built facility is located at an existing central or local government owned facility (e.g. Linton, Ōhakea, Massey) with support facilities off-site.
E. Integrated or distributed facility *Auckland*	Two operating model options: • *Integrated* – purpose-built facility with all services on one site within Auckland city. An integrated design, build and maintenance contract is used to minimise operational costs. • *Distributed* – a purpose-built facility is located at an existing government owned facility with support facilities off-site.
F. Separate 'forward' and 'command' facilities *Manawatū and Auckland*	Emergency management (operational) and Ministerial and ODESC (strategic) coordination are run from two separate facilities. This would involve (i) a 'forward' NCMC in the Manawatū to coordinate immediate response needs and (ii) an Auckland based 'command' response to support sustained NCMC operations.

Cover Sheet for HRB Item 2

Meeting Date	08 December 2022
Sponsoring Agency	National Emergency Management Agency
	Roger Ball, Acting Deputy Chief Executive – Emergency Management, Director of Civil Defence Emergency Management
	roger.ball@nema.govt.nz
	027 246 8857
Item Title	**Catastrophic Event Readiness**

Purpose

1. NEMA conducted a multi-agency catastrophic planning (CATPLAN) workshop in the National Crisis Management Centre over the period 14-18 November 2022, to develop an operational plan to response to a magnitude 9.1 earthquake in the Hikurangi Subduction Zone. This paper reports the outcome of the workshop and next steps for agencies.

Recommendations

2. It is recommended that HRB:

   a. **Agree** to support the continuation of the CATPLAN program and the emerging workflows;

   b. **Note** that CE NEMA will seek assurance from Agencies and other affected entities, whether their respective agency response and business continuity arrangements are adequate for a catastrophic event including one that requires fail over of agency leadership and operations from Wellington to alternate site(s), and

   c. **Note** that emerging workflows may affect current agency work programs and may require additional investment.

Comment

3. NEMA raised this issue at the HRB meeting on 19 October 2022, where Professor Tom Wilson (NEMA Chief Science Advisor) presented the scenario of a magnitude 9.1 earthquake in the southern end of the Hikurangi Subduction Zone.

Papers accompanying this cover sheet

Item 2B *Catastrophic Event Readiness*

[Not in Scope]

24 November 2022

Members
Hazard Risk Board

Catastrophic Event Readiness

Purpose

1. NEMA held a multi-agency catastrophic planning (CATPLAN) workshop to develop operational plans for a Hikurangi magnitude 9.1 earthquake and tsunami scenario. This paper reports the outcome of the CATPLAN 22-1 workshop and next steps for agencies.

Catastrophic event planning confirmed gaps in national operational readiness

2. An event of catastrophic magnitude could occur at any time in New Zealand, and agencies with Emergency Management responsibilities are not ready to stage an effective response. A catastrophic event would significantly impact the country and there is likely an expectation from the public that planning for an event such as this is in place. Public expectations do not match our current reality and the CATPLAN program aims to understand and close this gap.

3. NEMA's five-day catastrophic planning workshop held mid-November, was aimed at developing operational plans to respond to a catastrophic Hikurangi subduction zone earthquake and tsunami. Following a science and operational/political environment briefing, attendees worked in syndicates to develop All-of-Government response priorities, information requirements, and identify capabilities and gaps to respond to a scenario like this. The consequence of the event included the need to fail over all significant government business from Wellington to alternative sites, which for most agencies means Auckland.

4. The workshop was well attended, with thirty agencies from across central government, a number of civil defence emergency management (CDEM) Groups, and non-government organisations sending representatives. There was a broad range of experience with operational response planning among attendees, with some agencies able to send experienced planners to participate, and others sending attendees with little to no planning experience. Attending agencies are included in Annex A.

5. The CATPLAN 22-1 workshop identified a number of operational readiness gaps which will require an All-of-Government (or at the least, multi-agency) effort to remedy working across Aotearoa with iwi/Māori, local government, the private sector and the wider community. The most significant themes identified include:

    a. Building a nationally consistent common operating picture

    b. Interoperability of all-of-government alternate communications

    c. Identification and prioritisation of key resources domestically

    d. Identification and prioritisation of key resources internationally

    e. Enhancing Agency business continuity planning to ensure continued operation following a catastrophic event

f. Increased public education efforts to inform about catastrophic events, undertake preparedness activities, and build better community resilience

g. Alternative workforce arrangements to support a national response should Wellington be rendered inoperable

6. Secondary benefits of the CATPLAN 22-1 workshop include familiarising participants with the National Crisis Management Centre in the Beehive and familiarising the participants with the Wellington Earthquake National Initial Response Plan (WENIRP).

Next steps

7. NEMA is collating the results from the CATPLAN 22-1 workshop in order to fully identify what the gaps and issues are in New Zealand's preparedness, and what needs to be done to address these.

8. NEMA is developing the first draft of the Hikurangi M9 Operational Response Plan by 31 Dec 2022, in order to socialise it with agencies for comment early in 2023, ahead of the plan's finalisation in April 2023.

9. Following finalisation of the Hikurangi M9 Operational Response Plan, NEMA will work with Civil Defence Emergency Management (CDEM) Groups to regionalise arrangements and ensure local and regional considerations are built into the national planning. The regionalisation of CATPLAN 22-1 (Hikurangi) will have a strong focus on integrating iwi/Māori partners and will work with CDEM Group timeframes, both of which are key to successful planning integration.

10. The second CATPLAN workshop (CATPLAN 23-1), based on an Alpine Fault rupture scenario, is planned for June 2023. This timeframe is intended to align with the planned Alpine Fault National Exercise, while also allowing sufficient time to progress post-CATPLAN 22-1 (Hikurangi) planning and engagement activities.

11. NEMA intends to brief an overview of CATPLAN 22-1 outcomes to ODESC in Q1 2023 and report back to the HRB in Q2 2023 following agency feedback on the Hikurangi M9 Operational Response Plan.

Alternative National Crisis Management Centre Project Update

12. Wellington faces risk from multiple seismic hazards, including the Alpine Fault, the Wellington Fault, and the Hikurangi Subduction Zone. The city's coastal position also places it at risk from large tsunami, from both local and distant sources.

13. The rapid mobilisation of an effective NCMC is critical to central government's coordination of a major crisis. However, a seismic or tsunami event that significantly affects Wellington could render the primary NCMC facility inoperable and would reduce the ability of Wellington-based staff to respond.

14. The current arrangements for an alternative NCMC (aNCMC) – a 'cold start' facility at Ellerslie Racecourse in Auckland – are not fit for purpose. In December 2021, the Cabinet Priorities Committee directed the National Emergency Management Agency (NEMA) to develop an urgent business case for an alternative NCMC facility outside Wellington [CPC-21-MIN-0032].

15. A detailed business case is underway for an aNCMC outside Wellington. As well as physical facilities, the business case will cover the overall NCMC operating model.

Alternative NCMC Workforce

16. The indicative business case for the aNCMC identified a gap in the number of trained staff outside Wellington who could step in to operate an aNCMC.

17. Workforce modelling suggests more than 600 people would be required to staff a 24-hour response. So far, NEMA has identified approximately 300 Auckland-based staff from central government agencies. Alternate National Controllers outside Wellington are also required.

18. Given their other critical responsibilities during a response, it is highly unlikely that central government agencies alone could provide all the staff required for a contingent workforce. However, the Mobility Hub at Te Kawa Mataaho is available and can assist to find resources from across the public service.

19. NEMA is broadening its engagement to include the wider public sector and has started to investigate other potential workforce sources. Options being explored include private business and developing a cohort of 'emergency management reservists'. NEMA will continue to examine options to staff an alternative NCMA workforce.

Ability to function after a disruptive event - business continuity

20. A successful response to a catastrophic event will rely on agencies not just being able to perform their critical functions, including their response functions, but also being in a position to support system activity. Being able to do this following a disruptive event requires sound business continuity management (in advance of the event).

21. To support CEs to ensure their respective business continuity arrangements have taken into account relevant impacts, NEMA will share the Hikurangi subduction earthquake and tsunami scenario, high-level impacts, and the national catastrophic event plan with agencies. To ensure momentum of the catastrophic event readiness continues, CE NEMA will seek confirmation from all HRB agencies and other contributing Agencies/entities that their response-related plans, and their business continuity plans, are adequate for a catastrophic event. Advice on the timeframe for this will be sought at HRB/SIB.

Recommendations

22. It is recommended that HRB:

    a. ***Agree*** to support the continuation of the CATPLAN program and the emerging workflows;

    b. ***Note*** that CE NEMA will seek assurance from Agencies and other affected entities, whether their respective agency response and business continuity arrangements are adequate for a catastrophic event including one that requires fail over of agency leadership and operations from Wellington to alternate site(s), and

    c. ***Note*** that emerging workflows may affect current agency work programs and may require additional investment.

Annex A: Attending agencies

- National Emergency Management Agency
- Auckland Emergency Management
- Coroners' Court
- Department of Corrections
- Department of Internal Affairs
- Department of Prime Minister and Cabinet
- East Coast LAB | Hikurangi Subduction Zone M9
- Fire and Emergency New Zealand
- GNS Science
- Hawke's Bay CDEM Group
- Ministry of Business, Innovation, and Employment
- Ministry of Foreign Affairs and Trade
- Ministry of Justice
- Ministry of Primary Industries
- Ministry of Social Development
- Ministry of Transport
- New Zealand Customs Service
- New Zealand Defence Force
- New Zealand Police
- New Zealand Red Cross
- Resilience National Science Challenge
- St John Ambulance
- Tairawhiti CDEM Group
- Te Puni Kōkiri
- Te Whatu Ora - Health NZ
- The Treasury
- Waka Kotahi
- Wellington Free Ambulance
- Wellington Regional Emergency Management Office

National Emergency Management Agency
Catastrophic Event Readiness

National Emergency Management Agency
Te Rākau Whakamarumaru

High-level considerations for discussion

Reduction

- What actions can your agency take to promote and develop resilience / preparedness in communities & private sector for very large scale events?
- How do we reduce tsunami deaths? Eg can we make it easier to evacuate vertically; are our public education campaigns effective?

Readiness

- How prepared is your agency for a catastrophic event where you need to fail over to alternate sites?
- Do we understand government's critical functions?
- How do we manage the gap between the national credible response & what will be needed?
- How do we utilise international assistance, & our international relationships, to supplement NZ's official response (e.g. could Australia play a greater role in supporting us)?
- How will your agency communicate with others?
- How can we build nationally-consistent situational awareness?
- Do we understand what aid is needed for a very large-scale event; what humanitarian standards are acceptable; and how we can utilise the international non-government organisations community?
- How can we access the non-Wellington alternate workforce? (41 agencies in Auckland have identified 300 staff)

Response

- How will we maintain continuity of the Executive and also government?
- What critical national & international relief is required & how do we get it to where it is needed?
- Will we be able to communicate effectively with the public?
- Noting interdependencies, what's the priority to restore lifelines?
- Are we ready to effectively integrate private sector resources & do we understand what's available?
- How much control will we need over the market?

How will we recover?

- How do we effectively involve Māori / iwi & meet Treaty obligations?
- What organisational, legislative, and leadership structures will we need (is our current legislation adequate)?
- What's NZ's economic & financial recovery plan; how will we support financial institutions?
- What's the plan to revive livelihoods; and the prioritisation of rebuilding / replacing assets?
- How will we manage equity, especially for the disproportionally impacted?
- How will we support community wellbeing & what does long-term psychosocial support for a very large-scale event look like?

Q1 2023	Q2 2023	Q3 2023	Q4 2023	Q1 2024	Q2 2024
ODESC Meeting	Deep dives on specific challenges; Alpine Fault CATPLAN workshop	Agency BCPs & catastrophic event response plans updated		Test of Alpine Fault CATPLAN (National Exercise)	

Indicative Statistics

Casualties: Shaking + Tsunami (with % evacuation)
Injuries: 25,960 (70% evac) 32,030 (0% evac)
Deaths: 22,180 (70% evac) 68,670 (0% evac)
Likely overwhelm health system

Evacuated (displaced) population from tsunami alone:
>400,000 people in activated tsunami evacuation zones (immediately)
>100,000 people in activated tsunami evacuation zones (24 hours)
>30,000 tsunami impacted residential homes

Build environment damage (all buildings types):
Buildings: shaking $130 B + tsunami $14 B = $144 B total
Approx. half of Great East Japan EQ (2011)
A lot of exposed **critical infrastructure** (to be modelled)

Cover Sheet for HRB / SIB Item 2

Meeting Date	11 May 2023
Sponsoring Agency	NEMA
Item Title	Our collective readiness for a catastrophic event, and reflections on recent severe weather events

Purpose

1. This item updates HRB and SIB on readiness activity for a catastrophic event and provides an opportunity to reflect on recent severe weather events, including Cyclone Gabrielle.

Recommendations

2. It is **recommended** that HRB / SIB:
    a. ***Note*** progress on catastrophic readiness: a five-day planning workshop was held in November 2022; Auckland will be recommended as the preferred location for an alternative NCMC facility; 400 individuals based in / around Auckland have been identified to form a workforce pool (out of the target of 600); and the Continuity of Executive Government and Parliament Plan is being revised.
    b. ***Note*** a successful response to a catastrophic event will rely on agencies having robust business continuity arrangements that take into account the likely impacts of the event.
    c. ***Reflect*** on Cyclone Gabrielle, particularly system challenges (and solutions) for both a crisis and, extrapolating out, for a catastrophic event.

Comment

3. Catastrophic readiness has been the subject of items at the last two combined HRB / SIB meetings as well as at HRB and PSLT meetings.
4. Recent severe weather events, including Cyclone Gabrielle, provide an opportunity to reflect and share experiences particularly around what worked or didn't work at a system level.
5. CEs are also invited to extrapolate out to a catastrophic event and consider the system challenges (and solution) that we that we need to collectively work together to mitigate; many of the challenges are beyond the scope of single agencies to address.

Papers accompanying this cover sheet

Item 2B Our collective readiness for a catastrophic event, and reflections on recent severe weather events

Contacts

6. Sarah Holland s9(2)(a)

11 May 2023

Members
Hazard Risk Board
Security & Intelligence Board

Our collective readiness for a catastrophic event, and reflections on recent severe weather events

Purpose

1. This item updates HRB and SIB on readiness activity for a catastrophic event and provides an opportunity to reflect on recent severe weather events, including Cyclone Gabrielle.

Background

2. Catastrophic readiness was discussed at the last combined HRB/SIB meeting in October 2022 and also at the HRB meeting in December 2022.
3. A catastrophic event is characterised by devastating physical and social impacts on thousands of people across multiple regions. It would be significantly larger than events such as the Christchurch (2011) and Kaikoura (2016) earthquakes, and Cyclone Gabrielle (2023).
4. Overseas experience is that crisis plans cannot be scaled up; a catastrophic event requires its own planning. Catastrophic events are rare, and planning is often stymied by an inability to imagine events of this scale. Major national and international resources will be required and there will be massive challenges for recovery.
5. New Zealand is susceptible to a number of natural hazard events that could cause a catastrophic event including volcanic eruptions, earthquakes and tsunamis. Recent scientific advice (2021) found that the probability (75%) of a significant Alpine Fault earthquake in the next 50 years (magnitude 8 and above) was higher than previously understood. The Hikurangi Subduction Zone, which is capable of producing a large magnitude earthquake (>Mw8.5), has a 30 percent risk of rupture within the next 50 years. Challenges to any response and recovery will be compounded if Wellington, as the capital city and the heart of government, is inoperable.

Roles of the national security and emergency management system leaders

6. During response and recovery, the public service has three roles:
    a. **Deliver response activity** - e.g., leadership; mass casualty management; provision of water, food and shelter; restoration of lifeline utilities; request & deployment of international assistance; establishment of emergency supply chains; public communications; upholding Treaty partner obligations. These are all interdependent.

b. **Contribute to the system response** – there is much in here ranging from supporting the response with staff and assets, to prioritising rebuilding; reviving livelihoods; rebuilding NZ's economy; and planning for the short, medium, and longer-term recovery.

c. **Continue critical service delivery** – these are the non-response activities that government needs to continue to deliver to keep New Zealand functioning.

Activity since the last HRB/SIB meeting

Catastrophic planning workshop

7. In November 2022, 80 officials from thirty agencies participated in a five-day catastrophic planning (CATPLAN) workshop. Whilst this progressed the development of operational plans, there is still much work to do in interconnected areas such as: provision of rapid relief; mass fatality management; development of a nationally consistent common operating picture; interoperability of all-of-government alternate communications; and identification and prioritisation of key international resources.

8. While the impact of Cyclone Gabrielle was lesser than the scenario used for CATPLAN, the response saw the emergence of many of the issues identified such as providing welfare support to isolated communities for extended periods of time, and establishing effective alternative communications. NEMA is reevaluating CATPLAN to ensure the scope of the programme is still sufficient, and the lessons learned during the Cyclone Gabrielle response are incorporated into planning.

9. Catastrophic planning arrangements will be tested in a national exercise in 2024.

Alternative workforce pool and National Crisis Management Centre facility

10. In the event that Wellington is inoperable, it is essential that there are robust alternative arrangements for the leadership and coordination of the national response. These include an alternative National Crisis Management Centre (NCMC) facility; staff; and an agreed and understood operating model supported by systems such as a common operating picture, data/insights and intelligence.

11. **Workforce** NEMA has connected with 53 organisations and has 400 staff to form a contingent workforce pool. As this is still short of the target of 600[1] by the end of June 2023, in April CE NEMA wrote again to all PSLT, seeking their support to identify suitable staff who could be released following an event making Wellington inoperable. Training for the contingent pool commenced this month (May).

12. **Operating model** In conjunction with other agencies, NEMA is developing a common operating model, based on CIMS, that is consistent across both the primary (i.e. Wellington) and alternative NCMCs. This is planned to be completed at the end of June 2023; updating of standard operating procedures and processes will follow.

13. **Facility** Whilst the location of a fit-for-purpose alternative NCMC will be decided by Cabinet shortly, NEMA has identified Auckland as the preferred location[2]. The development of the Detailed Business Case for Budget 2024 consideration is on track but

[1] Workforce modelling identified a need for a minimum of 600 staff over three shifts

[2] Key considerations were workforce availably; natural hazard risk; affordability

reliant on Budget 24 funding. HRB and SIB have previously discussed that the current alternative NCMC (Ellerslie Event Centre) is not fit for purpose. As carrying this operational risk until a replacement facility is available (possibly late 2026) is not acceptable, NEMA will be working with agencies to enhance the current solution.

Business continuity following a disaster or catastrophic event

14. **Continuity of Government** NEMA is coordinating a revision of the "Continued Delivery of Executive Government and Parliament Plan"[3,4]. This is expected to consider the overall *delivery* of Executive Government and Parliamentary business in a broad sense (including, for example, virtual alternatives to a physical relocation and different time horizons). The Plan is to be considered by Cabinet by the end of 2023.

15. Delivering on the three roles of the public service discussed in para 6 requires robust business continuity arrangements[5,6] that consider the conditions of a catastrophic event. Accountability for each agency's business disruption arrangements sit with each Chief Executive and it is pleasing to hear of agencies, such as health and Police who have run tabletop exercises or scenarios with their Executive Leadership Teams.

16. In April 2023, CE NEMA wrote to all PSLT with prompts to support CEs to gain assurance that their agency's business disruption planning was appropriate.

Reflections from recent North Island Severe Weather Events

17. There have been three severe weather events in 2023 to date: Cyclone Hale, Auckland Anniversary weekend flooding, and Cyclone Gabrielle.

18. The response and recovery effort has been a significant and all-of-government effort. In addition to agencies delivering their mandated activity, 40 organisations provided 380 individuals to the NCMC in either liaison or surge roles, and an additional 370 staff, plus 190 Response Team volunteers, were deployed by the NCMC to regions to surge the local civil defence emergency management effort. These numbers exclude NEMA staff; over 85% of NEMA was directly involved in the response and/or early recovery with the remainder performing essential corporate functions. Seventeen countries officially offered assistance; three were accepted (80 response staff).

19. The Government has yet to make a decision regarding a review.

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[3] This has not been updated since it was developed in 2014. It focuses on the tasks required to relocate Ministers, MPs and essential staff to an emergency parliamentary facility at Devonport Naval Base.

[4] NEMA is coordinating work by DPMC, Cabinet Office, DIA Ministerial Services, Office of the Clerk, Parliamentary Service and the Public Service Commission.

[5] s58 of the Civil Defence Emergency Management Act 2002 requires "Departments to prepare plans to continue functioning during and after emergency. Every department must—
(a) ensure that it is able to function to the fullest possible extent, even though this may be at a reduced level, during and after an emergency:
(b) make available to the Director in writing, on request, its plan for functioning during and after an emergency.

[6] The Protective Security Requirements (GOV3) have a requirement and guidance to prepare for business continuity

Reflection on events - discussion

20. Given the all-of-government nature of significant responses, this item provides an opportunity for CEs to reflect and share their experiences and observations, and also to propose a way of progressing issues raised.

21. At a system level, what worked; didn't work; or could be improved? As examples, NEMA considers the establishment of a kaitohotohu function (understanding and coordination of iwi Māori needs at the centre of the response) and the integration of science successful and that system situational awareness needs more work.

22. In addition to experiences directly related to Cyclone Gabrielle, also of interest is extrapolating out to a much more significant event. For example, 25,000 fatalities (rather than 15) and a similar number of injured; widespread infrastructure failure for months rather than days and weeks; the need to coordinate the response from Auckland; and the reliance on significant international assistance.

23. Of particular interest are system challenges (and solutions) that we need to collectively work together to mitigate; many of the challenges are beyond the scope of single agencies to address.

24. Given that the Cyclone Recovery CEs Board has been established, it is proposed that recovery-related observations are not traversed in this HRB/SIB hui.

Recommendations

25. HRB and SIB are invited to:

    a. ***Note*** progress on catastrophic readiness: a five-day planning workshop was held in November 2022; Auckland will be recommended as the preferred location for an alternative NCMC facility; 400 individuals based in / around Auckland have been identified to form a workforce pool (out of the target of 600); and the Continuity of Executive Government and Parliament Plan is being revised.

    b. ***Note*** a successful response to a catastrophic event will rely on agencies having robust business continuity arrangements that take into account the likely impacts of the event.

    c. ***Reflect*** on Cyclone Gabrielle, particularly system challenges (and solutions) for both a crisis and, extrapolating out, for a catastrophic event.

ODESC
Officials' Committee for Domestic and External Security Coordination

MINUTES OF JOINT HAZARD RISK BOARD AND SECURITY AND INTELLIGENCE BOARD MEETING

19 October 2022
Members Only Dining Room

[Not in Scope]

Item 2: Wellington Catastrophic Event Readiness

3. Dave Gawn, Chief Executive of the National Emergency Management Agency (NEMA) highlighted to members concerns about New Zealand's readiness for catastrophic events. Whilst New Zealand has experienced disasters such as the 2011 Christchurch Earthquake and the 2016 Kaikoura Earthquake, it has not experienced a catastrophic event at the level to which it overwhelms a country and its resources. Japan's 2011 Tōhoku earthquake and tsunami, and Hurricane Katrina were cited as such examples. Similarly, it is expected that ruptures of the Hikurangi or Alpine faults, or a major volcanic eruption could cause a catastrophic event in New Zealand.
4. Strategic-level response plans such as the Wellington Earthquake National Initial Response Plan (WENIRP) have been developed, however action plans detailing critical tasks, roles and responsibilities from an all-of-government perspective do not exist.
5. Tom Wilson, NEMA's Chief Science Adviser, presented a maximum credible event scenario for a Hikurangi Subduction Zone Earthquake. There is a 25 percent chance of a magnitude 8-9 earthquake in the southern part of the Hikurangi Subduction zone (Southern Hawkes Bay to Wellington) in the next 50 years.[2] Approximately five minutes of shaking would occur, and this would trigger a tsunami, landslides, and liquefaction. Most of the East Coast of the North Island would have 15-30 minutes to evacuate before the tsunami arrives. In Wellington moderate to severe impact on the built environment is expected (approximately $119 billion of damage) and critical infrastructure would be impacted. Wellington's health system would be overwhelmed with approximately 20,000 people injured, and 20,000 deaths if 70 percent evacuation is achieved. Over 100,000 people would be displaced as they live in a tsunami zone.

[Not in Scope]

[2] A likely credible event is an 8.6-8.9 earthquake.

6. NEMA is leading four interrelated workstreams in relation to New Zealand's readiness for a catastrophic event and will report back to Cabinet in December 2022 on progression of these workstreams. These are:

    a. *Alternative National Crisis Management Centre contingent workforce*. NEMA thanked agencies that have leant into this workstream;

    b. *Alternative National Crisis Management Centre (NCMC) Facility*. Cabinet has endorsed the indicative business case for an alternative NCMC facility and directed NEMA to commence the detailed business case. A decision on the preferred operating model and location will be sought from Cabinet in February/March 2023;

    c. *Catastrophic event plan (operational response)*. Based on a Hikurangi subduction zone earthquake and tsunami scenario, a five-day workshop will take place in November and produce an operational plan so that NEMA and agencies are clear on their obligations and how they will be delivered; and

    d. *All-of-Government Business Continuity Management*. This includes the plan for the Emergency Relocation of Executive and Parliament, which needs reviewing and refreshing, and linking to ODESC arrangements and agencies' BCP.

7. The Boards:

    a. queried if NEMA were engaging with local government regarding this work, with the intent being to join forces rather than compete with existing work that has been completed or is underway. NEMA advised that they have already been engaging and that key local government representatives have been invited to the five-day workshop.

    b. queried if a virtual option for the alternative NCMC could be considered. NEMA advised that for a catastrophic event, it is not guaranteed that digital critical infrastructure would still be available but they are looking at how it could work.

    c. questioned whether any country has succeeded in responding to a catastrophic event without foreign support. NEMA advised no, however noted that planning and being prepared for such an event saves lives. Preparation includes identifying what international assistance is needed and logistical elements to obtain this during crisis.

    d encouraged NEMA to engage with agencies undertaking similar significant pieces of work to avoid duplication and identify mitigations and funding mechanism which may be beneficial to both. This includes the Ministry of Business, Innovation, and Employment's (MBIE) work in response to the National Adaptation Plan, and the Ministry for Primary Industries (MPI) Foot-and-Mouth Disease readiness activity.

8. Brook Barrington, Chief Executive of the Department of the Prime Minister and Cabinet (DPMC), suggested that New Zealand's maximum credible **response** is what needs to be determined, rather than taking it from the perspective of what is needed to respond to a maximum credible **event**, given our limited assets base and resources. Agencies should think of their response to a catastrophic event by determining what is needed in the first hour, day, week, and month. **NEMA were directed to report back at the December**

HRB on the outcome of the planning workshop, identifying what the gaps or issues are in New Zealand's preparedness, and what needs to be done to address these. ODESC will then meet at an appropriate point regarding catastrophic event readiness.

9. The Boards:

    a. **Noted** that the identification and training of an Auckland-based contingent workforce for the alternative National Crisis Management Centre is progressing and progress will be included in a December report back to Cabinet;

    b. **Agreed** to support the multi-agency five-day activity from 14-18 November that will develop a Catastrophic Event plan based on a Hikurangi subduction earthquake and tsunami;

    c. **Noted** that NEMA has commenced work on a detailed business case for an alternative NCMC and that the preferred location and operating model will be decided by Cabinet in early 2023;

    d. **Noted** that Cabinet has asked for a report back by the end of the year on a review of the Emergency Relocation of Executive Government and Parliament plan; and

    e. **Agreed** to support, as is relevant, the revision of the parliamentary/ministerial plan for continuity of services following a disruptive Wellington event.

[Not in Scope]

[Not in Scope]

[Not in Scope]

[Not in Scope]

[Not in Scope]

Meeting Action Items

Para	Detail	Lead
8	NEMA were directed to report back at the December HRB on the outcome of the planning workshop, identifying what the gaps or issues are in New Zealand's preparedness, and what needs to be done to address these.	NEMA

[Not in Scope]

[Not in Scope]

ODESC
Officials' Committee for Domestic and External Security Coordination

MINUTES OF HAZARD RISK BOARD MEETING

8 December 2022

Defence House Level 10 Boardroom

[Not in Scope]

[Not in Scope]

Item 2: Catastrophic Event Readiness

3. Dave Gawn, Chief Executive of the National Emergency Management Agency (NEMA) and Roger Ball, acting Director Emergency Management, provided a report back to members on the five-day catastrophic planning 'sprint' held by NEMA in November 2022. Over 80 people from more than 30 agencies had attended, and Dave thanked agencies for their support of the process.

4. NEMA touched on some of the science briefed to the October joint HRB/Security and Intelligence Board (SIB) meeting as context for the Hikurangi Magnitude 9 scenario used for the planning. They advised that NEMA's intent was to take the outcomes from the planning sprint and distil these into a series of deep dives against the 4 Rs and specific functions that would be required for a catastrophic event response

5. NEMA emphasised that one of the key learnings from the sprint and from international experience was that it was difficult for people to imagine an event at a catastrophic scale, which made it difficult to understand what such an event might mean from a national response perspective. Additionally, standard emergency response plans do not easily scale up to a catastrophic event, meaning catastrophic events require a more tailored approach.

6. NEMA provided a more granular breakdown of the likely effects of the scenario, and the outcomes of the planning sprint. Some of the key numbers were that, even with a 70% evacuation rate, New Zealand wi l likely have around 26,000 casualties requiring medical assistance, and around 22,000 fatalities. 400,000 people would be required to evacuate, and 30,000 residential homes would be impacted – compared to 4,700 in Christchurch's Red Zone. Damages to the built environment alone would be at least $144 billion, and the economic and critical infrastructure impacts were still unknown.

7. The initial findings that had emerged from the sprint included: the absence of a common operating picture across government, the need for interoperable all-of-government alternate communications, identification and prioritisation of key resources domestically and internationally, enhancing agency business continuity planning to ensure continued operation following a catastrophic event, stronger public education and preparedness activities for catastrophic events, alternative workforce arrangements to support a national response should Wellington be rendered inoperable, and risk reduction and mitigation measures such as vertical evacuation standards.

8. NEMA highlighted the importance of learning from countries that had experienced catastrophic events, such as Japan, who had experience from the 2011 Tōhoku 9.1 earthquake and subsequent tsunami. A key example of the lessons NEMA was already taking from Japan included the resilience of heritage buildings, including the location of plans for these buildings – in New Zealand, these were often stored in the buildings themselves and so could be lost if the building were sufficiently damaged.

9. NEMA advised that one of the key areas in which they needed help was for deep dives that related to subject areas where NEMA was not the subject matter expert. The other

request from NEMA was with regards to business continuity plans (BCPs). HRB discussed the best way for agencies to undertake reviews of their BCPs, given the afore-mentioned difficulty for people to imagine how a catastrophic event would actually present.

10. HRB:

    a. **Agreed** that agencies should review their BCPs with a catastrophic event lens by 30 June 2023, and that NEMA would provide ~~support~~ system leadership for this as required.

    b. **Directed** NEMA to develop principles for the ~~plans~~ catastrophic event BCPs, so that agencies had a framework from which to work.

    c. Discussed the public education aspect of planning for catastrophic events. Dave noted the well-developed Alpine Fault public education campaign in the South Island. [Not in Scope]

    d. Discussed some of the ways in which agencies could collaborate, including on public education campaigns, and on some of the longer-term resilience work on issues like resource management and climate adaption.

    e. **Noted** that the next catastrophic planning sprint would be based on an Alpine Fault scenario, and that this may be postponed from mid-2023 in order for NEMA to have the principles developed for agency BCPs.

[Not in Scope]

12. HRB:

    a. **Agreed** to support the continuation of the CATPLAN program and the emerging workflows;

    b. **Noted** that CE NEMA would seek assurance from agencies and other affected entities on whether their respective agency response and business continuity arrangements were adequate for a catastrophic event, including one that required fail over of agency leadership and operations from Wellington to alternate site(s);

    c. **Noted** that emerging workflows may affect current agency work programs and may require additional investments;

[Not in Scope]

[Not in Scope]

[Not in Scope]

[Not in Scope]

Meeting Action Items

Para	Detail	Lead
10b	NEMA to develop principles for the review of catastrophic event business continuity plans, so that agencies have a framework from which to work	NEMA

[Not in Scope]

ODESC
Officials' Committee for Domestic and External Security Coordination

MINUTES OF THE JOINT HAZARD RISK BOARD AND SECURITY AND INTELLIGENCE BOARD MEETING

11 May 2022 [*correct date: 11 May 2023*]

Defence House G.24 and G.25

[Not in Scope]

Item 2: Catastrophic Event Readiness and Reflections on the Recent Severe Weather Events

National Emergency Management Agency update

4. Dave Gawn, Chief Executive of the National Emergency Management Agency (NEMA) provided an update on catastrophic planning since the October 2022 HRB/SIB, in light of the severe weather and flooding that had affected the North Island at the beginning of 2023. He thanked agencies for their support during the response to the severe weather event.

5. CE NEMA noted that while the response to the severe weather event had been a significant effort for New Zealand,[2] it was small in comparison to a catastrophic event, in terms of impact, and response staff and resource requirements. Similarly, while the recovery from the severe weather event would be even more significant than the response, it is expected to be small in comparison to the recovery from a catastrophic event. New Zealand's emergency management system is not ready for a sizeable disaster nor a catastrophic event.

6. This comparison highlighted some specific gaps in New Zealand's national-level response capability. These included a long tail of impacts on business as usual as staff took time off in lieu, and the lack of a fit-for-purpose National Crisis Management Centre that was big enough to support the number of central coordination response staff that would be required. Additionally, the lack of ability to create consistent situational awareness slowed and hampered effective decision making.

[Not in Scope]

[2] Event Statistics: Over 130 organisations were involved, and a 24/7 National Crisis Management Centre (NCMC) operated for seven weeks. The day shift of this required over 180 people. 85% of NEMA contributed to the response, and 380 additional people were required to staff the bunker. Another 370 were deployed to the regions as part of NEMA's response, not including other agency deployments.

7. In relation to catastrophic event planning, CE NEMA thanked agencies for their support for NEMA's planning sprint, held in November 2022. The severe weather event had acted as somewhat of a trial of New Zealand's national emergency management response capability and capacity, and lessons from this had led NEMA to reshape their approach to catastrophic planning.
8. By September 2023, NEMA planned to develop a draft hazard-agnostic National Catastrophic Handbook, defining key coordination and collaboration elements for an All-of-Government catastrophic response. This would be supported by scenario-specific planning for events such as an Alpine Fault magnitude 8 earthquake, a Hiku angi magnitude 8 or higher earthquake and tsunami, a Taupo caldera volcanic event, and more. This planning would be informed by the growing number of reviews into the recent events.
9. Dr Thomas Wilson, NEMA's Chief Science Advisor, provided a briefing on the cumulative nature of catastrophic event probabilities, as part of work undertaken by the science community to quantitatively assess risk for major catastrophic events in the next 50 years.
    - The probability of an Alpine Fault Magnitude 8 event in that time is 75%. A Mt Taranaki eruption has a probability of 30-50%.
    - An earthquake on the Hikurangi subduction zone of magnitude 8.5 is 10-30%, and a larger 9.1 earthquake has a 1% chance[3].
    - A South American magnitude 9 earthquake causing a large tsunami has a 50% chance in the next 50 years, and an Auckland volcanic field eruption has a 5% chance.
10. While some of these were low probabilities, together they indicate a cumulatively high probability of a catastrophic event affecting New Zealand in the next 50 years, alongside the frequent non-catastrophic but nonetheless impactful disasters New Zealand experiences.

[Not in Scope]

[3] A 9.1 Hikurangi earthquake was the scenario used for the first catastrophic planning sprint in November 2022.

[Not in Scope]

[Not in Scope]

What comes next

21. The Boards discussed the next steps for catastrophic planning, and the resourcing issues that affect the system's ability to deliver on work programmes. CE NEMA advised that NEMA was about to commission a piece of work on a future emergency management force as a system wide concept. He also noted that NEMA does not have the resources to get ahead on their own, and so would be approaching agencies for support for working groups to advance critical work. The Boards noted that agencies were under resourced across the public service.

22. The Boards agreed that underinvestment across hazard risk, national security, and emergency management would mean government would not be able to deliver the resilience and event response that New Zealanders expect and deserve, and noted Australia's recent significant investment in this area. They noted that research shows that pre-investment in resilience is an order of magnitude less expensive than the equivalent recovery costs where that investment does not occur.

23. The Boards noted their strong interest in seeing NEMA's catastrophic readiness work programme, and in governing this collectively. CE NEMA advised that NEMA would return to the Boards with a value proposition for benefits to the All-of-Government approach and for individual agencies, and would work with NSG and the hazard risk sector to consider the areas of expertise that were needed.

24. The Boards noted a need for clarity and visibility about what good would look like to determine what could and should be resourced and funded. They also highlighted a need to identify critical gaps, so that the work programme could outline how these could be addressed. The Boards further agreed that the work programme should be prioritised based on critical gaps, and what would be easiest to accomplish in the short term. Board members considered that there would be a number of relatively low cost, high pay off options.

25. CE NEMA advised that one of the best value investments is public education, and that NEMA was already working with other organisations including media outlets on how more public education could be conducted. He also noted that New Zealand does not currently have mature training and development for the emergency management workforce.

26. The Boards discussed potential reviews of the recent North Island severe weather event. They noted there were a number of reviews and lessons management processes underway.

27. The Chair summarised the discussion, noting that Senior Officials Group (SOG) members were available to support the development of the catastrophic readiness work programme, and SOG meetings could be held as required. He noted the substantial number of lessons identified through the cyclone. The Chair noted that the next joint Board meeting was scheduled for October, which would present another opportunity to discuss

the draft hazard-agnostic National Catastrophic Handbook. An earlier meeting could also be scheduled if Chief Executives wanted to come together and align inputs into the handbook.

28. The Chair noted the clear and consistent themes around workforce, situational awareness, command and control, and critical infrastructure resilience. He reflected that the Hawkes Bay experience was a reminder that individual sectors could feel comfortable and prepared but knock-on effects could have a disproportionate impact.

29. The Boards:

- **Noted** progress on catastrophic event readiness;
- **Noted** a successful response to a catastrophic event will rely on agencies having robust business continuity arrangements that take into account the likely impacts of the event.
- **Directed** NEMA to return to the joint Boards with a prioritised work programme that identified capability gaps and provided guidance in particular on where short-term gains could be achieved.

[Not in Scope]

[Not in Scope]

Meeting Action Items

Para	Detail	Lead
29	Return to the joint Boards in 2023 with a prioritised readiness work programme that identifies capability gaps and includes guidance in particular on where short-term gains could be achieved	NEMA

[Not in Scope]