AGENDA/KAUPAPA

Te Kaunihera o Te Tairāwhiti
GISBORNE
DISTRICT COUNCIL

P O Box 747, Gisborne, Ph 06 867 2049 Fax 06 867 8076
Email service@gdc.govt.nz Web www.gdc.govt.nz

MEMBERSHIP: Her Worship the Mayor Rehette Stoltz (Chair), Josh Wharehinga (Deputy Chair), Debbie Gregory, Rawinia Parata, Ani Pahuru-Huriwai and Rob Telfer

CIVIL DEFENCE EMERGENCY MANAGEMENT GROUP/KAIWHAKAHAERE OHOTATA WHAKAMARU TŪMATANUI

DATE: Tuesday 3 September 2024

TIME: 9:00AM

AT: Te Ruma Kaunihera (Council Meeting Room), Awarua, Fitzherbert Street, Gisborne

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Civil Defence Emergency Management

Reports to:	Council
Chairperson:	Mayor Stoltz
Deputy Chairperson:	Deputy Mayor Josh Wharehinga
Membership:	Cr Debbie Gregory, Cr Rawinia Parata, Cr Ani Pahuru-Huriwai and Cr Rob Telfer and four iwi appointees (TBC).
Quorum:	Half of the members when the number is even and a majority when the membership is uneven.
Meeting Frequency:	As required. Meetings may take place on the same day as Council meetings.

Purpose

To perform the functions of a Civil Defence and Emergency Management Group required under section 12(1)(b) of the Civil Defence and Emergency Management Act 2002 (the Act).

To ensure that appropriate emergency management as detailed in the Civil Defence Emergency Management Act 2002 (the Act) is carried out within the Gisborne District.

Provide governance and oversight of the activities required to be undertaken on its behalf by the Act.

Terms of Reference

The Civil Defence and Emergency Management Committee has responsibility and authority to:

- Be Gisborne's strategic forum for civil defence emergency management planning and policy.
- Co-ordinate planning, programmes and activities related to civil defence emergency management across the areas of risk reduction, readiness, response and recovery.
- Assist in local civil defence emergency management planning activity through developing, approving, implementing and monitoring the Gisborne Civil Defence Emergency Management Group Plan and ensuring alignment of local planning with national plans and strategy.
- Establish and maintain a Civil Defence Emergency Management Co-ordinating Executive Group, as required by section 20 of the Act.
- Exercise the statutory powers and functions outlined in the Act, including those set out in sections 17 and 18 of the Act.

Relevant Legislation includes but is not limited to

Civil Defence Emergency Management Act 2002.

3.1. Confirmation of non-confidential Minutes 22 May 2024

MINUTES

Draft & Unconfirmed

Te Kaunihera o Te Tairāwhiti
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MINUTES of the CIVIL DEFENCE EMERGENCY MANAGEMENT GROUP / KAIWHAKAHAERE OHOTATA WHAKAMARU TŪMATANUI GROUP

Held in Te Ruma Kaunihera (Council Meeting Room), Awarua, Fitzherbert Street, Gisborne on Wednesday 22 May 2024 at 9:00AM.

PRESENT:

Her Worship the Mayor Rehette Stoltz (Chair), Josh Wharehinga (Deputy Chair), Debbie Gregory, Rawinia Parata, Ani Pahuru-Huriwai and Rob Telfer

IN ATTENDANCE:

Chief Executive Nedine Thatcher Swann, Director Lifelines Tim Barry, Director Engagement and Māori Partnerships Anita Reedy-Holthausen, Civil Defence Emergency Manager Ben Green, CDEM Advisor-Welfare Dallas Haynes, Principal Scientist Dr Murry Cave, Recovery Programme Director Rod Sheridan, Senior Regional Emergency Management Advisor, NEMA Ian Wilson, Senior Advisor, Deployable Capabilities NZ Response Teams Secretariat ,Liz Smith ,Chief Advisor Māori Gene Takarua, Collin Alder, Democracy & Support Services Manager Heather Kohn, and Committee Secretary Teremoana Kingi.

Secretarial Note: Ian Wilson, Liz Smith, Cr Pahuru-Huriwai, Cr Parata and Gene Takarua attended via audio visual link.

The meeting commenced with a karakia.

1. Apologies

There were no apologies.

2. Declarations of Interest

There were no declarations of interest.

3. Confirmation of non-confidential Minutes

3.1 Confirmation of non-confidential Minutes 14 February 2024

MOVED by Cr Wharehinga, seconded by Cr Gregory

That the Minutes of 14 February 2024 be accepted.

CARRIED

3.2 Action Register

Item 10.1 23-56 Hazards of Mud Volcanoes- Assignee - Dr Murray Cave.

- An informative document is in progress. A key area is Wheatstone Road where an inactive mud volcano is situated below a large number of dwellings.
- One of the most active sites which last erupted in 2020 recently erupted in Waimata Valley Road.

4. Leave of Absence

There were no leaves of absence.

5. Acknowledgements and Tributes

There were no acknowledgements and tributes.

6. Public Input and Petitions

There was no public input or petitions.

7. Extraordinary Business

There was no extraordinary business.

8. Notices of Motion

There were no notices of motion.

9. Adjourned Business

There was no adjourned business.

10. Reports of the Chief Executive and Staff for DECISION

10.1 24-152 Establishment of a New Zealand Rapid Response Team in Tairāwhiti.

Civil Defence Emergency Manager Ben Green, NEMA Ian Wilson, Senior Advisor and Deployable Capabilities and NZ Response Teams Secretariat Liz Smith presented.

Questions of clarification included:

- There are various ownership models, and most are owned and managed by Local or Regional Council. Some are independent teams that are either a trust or society that have a service agreement with their Local or Regional Council. These teams receive funding through their local Council, sponsorship and grants. There is also a University owned team.

- A total of 16 teams have been through a National Accreditation visit as part of an assurance process .
- The Rapid Response teams have the capability to be self-sufficient for 72 hours and can be deployed to other parts of New Zealand.
- There would be a flow on effect when teams are trained to provide a high degree of confidence, involving other teams in training.
- Progression would include a business case of how to improve and integrate the National framework.
- The aftermath of Cyclone Gabrielle and other local events offer an opportunity around the deliberate empowerment of community for response.
- Moving between three Civil Defence teams from various locations to assist one another would form part of a strategy.
- National Emergency Management Agency (Nema) cover the cost of training. Training is delivered to a competency framework which is funded nationally.
- There is opportunity to repurpose Council assets to offset a significant cost.
- The inclusion of other locations would be included in the business case to take forward.
- There is confidence around current funding to support rural and remote locations.
- There is another tranche of funding led by Sir Selwyn Parata.

MOVED by Cr Parata, seconded by Cr Wharehinga

That the Civil Defence Emergency Management Group/Kaiwhakahaere Ohotata Whakamaru Tūmatanui:

1. Recommends that the Tairawhiti Civil Defence Emergency Management Group:
    a. Approves the establishment of a dedicated New Zealand Response Team (NZRT) for Tairāwhiti (designated as the "Tairāwhiti Response Team "subject to the following:
        i. Determination of the business case and securing funding.

CARRIED

11. Reports of the Chief Executive and Staff for INFORMATION

11.1 24-99 Civil Defence Emergency Management Group Manager Report

Ben Green and Ian Wilson (Nema) presented.

Questions of clarification included:

- A credit card is required to activate the Star link Satellites and there are ongoing monthly costs which posed issues during Cyclone Gabrielle. Nema are investigating how they can provide the network at a lower cost and be more beneficial.
- Nema will seek advice from operational teams to ensure that the functionality of the Satellites are fit for purpose.
- If the Star Link's that have been distributed are required to be activated, this cost would be covered by the Civil Defence Emergency Management Group.

MOVED by Cr Stoltz, seconded by Cr Wharehinga

That the Civil Defence Emergency Management Group/Kaiwhakahaere Ohotata Whakamaru Tūmatanui:

1. Notes the contents of this report.

11.2 24-131 Recovery Update.

Director Lifelines Tim Barry and Recovery Progamme Director presented.

Question of Clarification included:

- Residents who do not have access to bridges are being provided support within Councils capability. These residents have a direct point of contact within Council. There are challenges around negotiating solutions with these residents as they await the announcement of what funding New Zealand Transport Agency (NZTA) will receive.
- The Council have lobbied nationally for funding, highlighting the emotional impact on these communities.
- Funding was expected to be spent by the end of June. An extension until the end of September will be announced by the Government at the next budget.
- A cost of $1 million is budgeted for the entire work for the Green Bridge.
- There is funding for flood resilience and flood protection. There are three funding projects including recovery offers, woody debris and roading and bridges.
- There is a programme for Woody Debris cleanup which includes Te Araroa.
- There are delays with the Whenua Māori process which is run by the Department of the Prime Minister and Cabinet (DPMC). In November 2023 the Council provided requested information to DPMC and is currently awaiting an outcome regarding the process and how this will be resolved.

- A decision was made by the previous Council to insure the Peel Street Bridge. A review to insure additional bridges should be raised with the Finance & Performance Committee.

MOVED by Cr Stoltz, seconded by Cr Wharehinga

> That the Civil Defence Emergency Management Group/Kaiwhakahaere Ohotata Whakamaru Tūmatanui:
>
> 1. Notes the contents of this report.

CARRIED

Secretarial Note: The meeting adjourned at 10.44am for morning tea and reconvened at 11am.

11.3 24-162 Welfare Coordination Group Update

- Dallas Haynes was commended for her leadership in this space and the great work that has been achieved and the ongoing work being done.
- There were no questions of clarifications.

MOVED by Cr Parata, seconded by Cr Stoltz

> That the Civil Defence Emergency Management Group/Kaiwhakahaere Ohotata Whakamaru Tūmatanui:
>
> 1. Notes the contents of this report.

CARRIED

12. Close of Meeting

There being no further business, the meeting concluded at 11:14 am.

Rhette Stoltz
MAYOR

3.2. Action Register

Meeting Date	Item No.	Item	Status	Action Required	Assignee/s	Action Taken	Due Date
24/05/2023	10.1	23-56 Hazards of Mud Volcanoes	In progress	A one pager flyer to give effected dwelling owners some information about future mud volcano eruptions.	Dr Murry Cave	Due date has been extended to the next CDEM meeting of 3 September 2024.	03/09/2024
22/05/2024	13.1	Additional Action Items	Not yet started	Yvette to bring a report on the Group Plan approaches, outcomes and specific issues for decision to 3 September 2024 CDEM meeting.	Ben Green, Yvette Kinsella		03/09/2024

3.3. Governance Work Plan

2024 Civil Defence Emergency Management						Meeting Dates	
HUB	**Activity**	**Name of agenda item**	**Purpose**	**Report type**	**Owner**	**3-Sep**	**13-Nov**
Office of the Chief Executive	CDEM	Managers Report		Information (I)	Ben Green		
Office of the Chief Executive	CDEM	Welfare Recovery		Information (I)	Dallas Haynes		
Office of the Chief Executive	CDEM	Recovery Report		Information (I)	Rod Sheridan		
Office of the Chief Executive	CDEM	Group Plan Report	Discuss the Group Plan approaches, outcomes and specific issues for decision.	Decision (D)	Yvette Kinsella, Ben Green		

10. Reports of the Chief Executive and Staff for DECISION

Te Kaunihera o Te Tairāwhiti
GISBORNE
DISTRICT COUNCIL

24-257

Title: **24-257 Establishment of a New Zealand Rapid Response Team in Tairawhiti**

Section: Civil Defence Emergency Management

Prepared by: Ben Green - Civil Defence Emergency Manager

Meeting Date: Tuesday 3 September 2024

Legal: No	Financial: No	Significance: **Low**

Report to CIVIL DEFENCE EMERGENCY MANAGEMENT GROUP/KAIWHAKAHAERE OHOTATA WHAKAMARU TŪMATANUI for decision

PURPOSE - TE TAKE

The purpose of this report is to seek approval in principle for the establishment of a dedicated New Zealand Response Team (NZRT) for Tairāwhiti (designated as the "Tairāwhiti Response Team").

SUMMARY - HE WHAKARĀPOPOTOTANGA

A report was presented to Coordinating Executive Group (CEG) for consideration on 8 May. CEG endorsed the recommendation for the establishment of an NZRT and recommends that the Tairāwhiti Civil Defence Emergency Management Group (CDEM) consider and approve the establishment of a dedicated Tairāwhiti NZRT subject to the determination of the business case and funding.

The decisions or matters in this report are considered to be of **Low** significance in accordance with the Council's Significance and Engagement Policy.

RECOMMENDATIONS - NGĀ TŪTOHUNGA

That the Civil Defence Emergency Management Group/Kaiwhakahaere Ohotata Whakamaru Tūmatanui:

1. **Provides feedback on the draft Business Case for a Tairāwhiti Response Team (Attachment 1).**
2. **Endorses, in principle, the establishment of a Tairāwhiti Response Team as outlined in the Business Case and incorporating feedback provided by the Civil Defence Emergency Management Group at its 3 September meeting.**
3. **Instructs the Tairāwhiti Emergency Management Office (TEMO) to provide a more detailed funding and financing model including confirmation from funders of commitment to ongoing financial support.**

Authorised by:

Nedine Thatcher Swann - Chief Executive

Keywords: NZRT, CDEM, Tairāwhiti Civil Defence Emergency Management Group, Tairāwhiti New Zealand Response Team

BACKGROUND - HE WHAKAMĀRAMA

1. The Tairāwhiti CDEM Group area has a wide and varied hazard exposure and has experienced a significant number of emergencies in the past 5 years. There is general acceptance that as climate change impacts manifest we will see more extreme weather and emergency events will increase in their frequency and intensity.

Need identified

2. Based on learnings from the 2023 severe weather events (Cyclones Hale and Gabrielle), there is recognition that the region needs to establish a fully-trained and resourced response entity that can be deployed when required to support operational tasks during response and recovery.

3. Currently, there are community and iwi groups who are self-resourcing to deploy in response scenarios independent of existing CDEM arrangements in the region. There are concerns that such groups would not have the training, experience or equipment needed to effectively and safely respond to emergency situations. As such, there are considerable health and safety risks (and accompanying legal liability) to those groups, to other emergency responders, and to the organisations mandating these groups.

4. At its 22 May meeting, the CDEM Group agreed to establish a New Zealand Response Team in Tairāwhiti to proactively address these risks subject to the determination of a business case and the securing of funding.

NZ Response Teams

5. New Zealand Response Teams (NZRTs) are teams of highly trained volunteers who can be rapidly deployed to work alongside emergency services and other responding agencies to provide surge support to CDEM groups and their communities during and after emergency events.

6. NZRTs are located throughout New Zealand and have different capabilities tailored to the local hazards and risks within their regions.

7. NZRTs are governed by the NZRT Strategic Governance Group comprised of executive level officials from NEMA, FENZ, Police, Ministry of Health, St John, CDEM Group Managers. This group is responsible for the strategic direction and stewardship of the NZRT system. Underneath this body sits the NZRT Steering Group, comprised of emergency management professionals, that is responsible for approving registered NZRTs, operational oversight of NZRTs, monitoring their performance, and sharing best practice.

DISCUSSION and OPTIONS - WHAKAWHITINGA KŌRERO me ngā KŌWHIRINGA

8. The Tairāwhiti Emergency Management Office (TEMO) has prepared a business case for the establishment of an NZRT in Tairāwhiti – the Tairāwhiti Response Team. The business case outlines the actions and investment needed to establish the Tairāwhiti Response Team.

9. The Business Case is **Attachment 1**.

10. Officers are seeking feedback from the CDEM Group on the business case.

11. The business case includes an outline of costs to establish a Tairāwhiti Response Team and for its ongoing operation and the bones of a funding model are also outlined in the business case.

12. However, further work is needed to develop a sustainable funding and financing model including seeking confirmation from potential funders that they will fund the establishment and ongoing operation of the Tairāwhiti Response Team.

ASSESSMENT of SIGNIFICANCE - AROTAKENGA o NGĀ HIRANGA

Consideration of consistency with and impact on the Regional Land Transport Plan and its implementation
Overall Process: **Low** Significance
This Report: **Low** Significance

Impacts on Council's delivery of its Financial Strategy and Long Term Plan
Overall Process: **Low** Significance
This Report: **Low** Significance

Inconsistency with Council's current strategy and policy
Overall Process: **Low** Significance
This Report: **Low** Significance

The effects on all or a large part of the Gisborne district
Overall Process: **Low** Significance
This Report: **Low** Significance

The effects on individuals or specific communities
Overall Process: **Low** Significance
This Report: **Low** Significance

The level or history of public interest in the matter or issue
Overall Process: **Low** Significance
This Report: **Low** Significance

13. The decisions or matters in this report are considered to be of **Low** significance in accordance with Council's Significance and Engagement Policy. The establishment of the Tairāwhiti Response Team is still in its early stages.

TANGATA WHENUA/MĀORI ENGAGEMENT - TŪTAKITANGA TANGATA WHENUA

14. Given the operating model seeks to develop an integrated regional team that includes iwi volunteers (personnel and resources) operating under the integrated training framework that aligns to the team outputs, consultation with iwi will seek to develop the finer details on what will be a new model for an NZRT.

COMMUNITY ENGAGEMENT - TŪTAKITANGA HAPORI

15. The establishment of a Tairāwhiti Response Team is in response to growing community desire to see on the ground response capability bolstered throughout the region.

16. The core resource for the Tairāwhiti Response Team will be drawn from volunteers throughout the region. If approved, a communications plan will be developed as part of the recruitment and implementation phase to engage with the community.

CLIMATE CHANGE – Impacts / Implications - NGĀ REREKĒTANGA ĀHUARANGI – ngā whakaaweawe / ngā ritenga

17. The establishment of the Tairawhiti Response Team is a direct response to the impacts of climate change and the potential for more frequent and intense weather events in the region. The Tairāwhiti Response Team would provide surge support for communities in the region during such events.

CONSIDERATIONS - HEI WHAKAARO

Financial/Budget

18. The business case outlines the establishment and maintenance costs for the Tairāwhiti Response Team. Further work is required to identify the details of the funding model and garner formal and ongoing financial commitment from the funders.

Legal

19. The establishment of a Tairāwhiti Response Team seeks to mitigate the legal risks associated with under-skilled and inexperienced self-resourcing groups deploying during response scenarios.

POLICY and PLANNING IMPLICATIONS - KAUPAPA HERE me ngā RITENGA WHAKAMAHERE

20. The establishment and operation of the Tairāwhiti Response Team is a core part of the proposed new emergency management framework that is pending through the review of the Group Plan.

ATTACHMENTS - NGĀ TĀPIRITANGA

1. Attachment 1 - Tairawhiti NZRT Business Case 27 August 2024 [**24-257.1** - 10 pages]

PROJECT BUSINESS CASE

ESTABLISHMENT OF AN EMERGENCY MANAGEMENT RESPONSE TEAM WITHIN TAIRAWHITI

27 August 2024

Establishment of a Tairawhiti New Zealand Response Team (NZRT) Capability: Business Case

Executive Overview

Aim

1. This business case presents the crucial tasks and investment necessary to form a New Zealand Response Team (NZRT) within the Tairawhiti Civil Defence Emergency Management (CDEM) Group region.

Goal and Desired Outcome

2. The primary purpose is to establish an in-region NZRT capability consisting of highly trained volunteers within the Tairawhiti CDEM Group that can be deployed to support emergency response operations. The Tairawhiti CEG has agreed on the need for NZRT capability, and this was presented as a recommendation to the Tairawhiti CDEM Group on 22 May with approval granted subject to funding model options.
3. The initial focus for the establishment of an NZRT will be to undertake training to achieve national accreditation for the outputs agreed to by the Tairawhiti Emergency Services Coordinating Committee (ESCC). Accreditation will be pursued for the following NZRT capability framework strands:
    1) Foundation Skills
    2) Response to Floods
    3) Response to Storms
    4) Civil Defence Centre/Community Led Centre and Welfare Services

Advantages of an NZRT for the Tairawhiti Region

4. The Tairawhiti CDEM Group is exposed to a wide range of hazards and has faced numerous emergency events, especially in the last 4 years. It is widely accepted that with the onset and impacts of climate change, the Tairawhiti region will experience an increased frequency and intensity of severe weather events. In addition to extreme weather events, the Tairawhiti region is exposed to tectonic risks (including earthquakes, liquefaction, and tsunami) and other hazards such as pandemics, industrial incidents, wildfires, and droughts that affect communities. The formation of an NZRT capability in the region would provide a regional capability to support response and recovery operations:
    a. general response activities such as cordon management; public notifications and evacuations.
    b. reconnaissance and impact assessments.
    c. general support to emergency services; coordination of spontaneous volunteers; surge staffing for Community Emergency Operation Centres (EOCs) and the regional Emergency Coordination Centre (ECC).

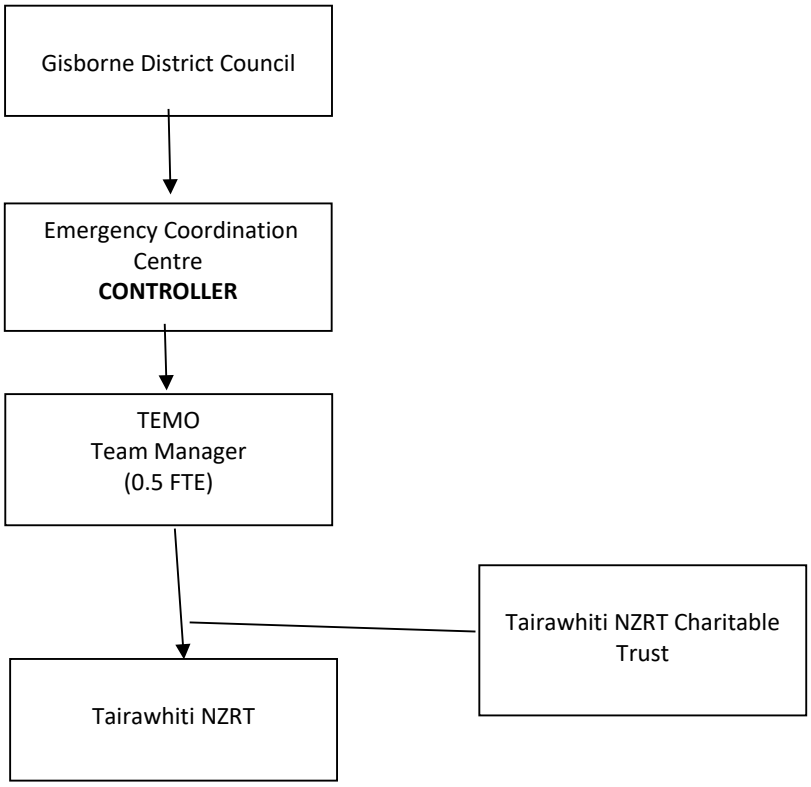
d. deployable facilities and caches.

e. response to Floods and Storms

f. Civil Defence Centre/Community Led Centre and welfare support.

Governance Structure

5. The overarching structure for the Tairawhiti NZRT is based on similar groups established around the country.



Required Priority Actions and Investment

6. Several sequenced actions and associated investment are required for the establishment of an NZRT which will meet the standards required for national accreditation. The following actions and investment priorities are presented for consideration:

Team Management and Administration

7. The NZRT Team Manager will be assigned from the Tairawhiti Emergency Management Office (TEMO) to mentor and manage the NZRT to maintain capability and standards. This role will consist of 0.5 FTE allocated from TEMO and incurs no additional head count or OPEX from the TEMO budget.

8. **Team Base Location**.
    1. **Phase 1**. (2 years) It is proposed that during the establishment of the Tairawhiti NZRT, the team will be based in Gisborne for the initial stage of set up and accreditation. This will see the team based centrally and configured to deploy across the region. The team would be able to support two concurrent deployments i.e. able to deploy to two separate locations.
    2. **Phase 2**. The future intention will be to add two additional teams embedded into the region at following locations:
        1) **Team West** – based in Patutahi and will cover the Poverty Bay River catchment.
        2) **Team East** – based in Te Puia Springs to cover Te Tairawhiti.
    3. Funding will be required to select an appropriate home base (location to be identified including associated capex and operating costs).

1) **Team Vehicles**. Approve investment for the following:

    a) 3 utility 4x4 vehicles (including storage capability and radios).

    b) Two Crew Cab trucks (Class 2) will be utilised from the FENZ fleet (ex- GDC Rural Fire light trucks).

    c) Two water tankers (ex-FENZ units). 3000 Litre and 5000 Litre

2) **Team General Stores and Personal Protective Equipment**

a. Approve investment for fit-out costs associated with general and personal protective equipment to ensure team members can deploy with the appropriate issue of clothing and equipment.

9. The following is a summary of the investment that would enable NZRT to reach the required capabilities to deliver the benefits outlined for the Tairawhiti Region:

Item	Indicative Initial cost (Year 1)	Indicative Annual cost
Team Management and Administration	$0 (allocated from TEMO)	$0 (Allocated from TEMO)
Team Capacity and Capability	$3,000.00	$3,000.00
Team Home Base	$109,700.00	$86,700.00
Team Vehicles	$120,000 (2 x utes)	Fleet OPEX
Team Equipment	$25,000.00	$5,000.00
Team Personal Protective Equipment	$50,000 (25 x $2K each)	$5,000.00

Team SOPs / information management	$500.00	$500.00
NZRT indemnity insurance & incidentals / marketing	$4,200.00	$4,200.00
Flood response equipment	$35,000	$5000

Purpose of this Business Case

10. This business case outlines the actions and investment required to establish a dedicated Tairawhiti CDEM Group NZRT, and to ensure that the NZRT capability achieves and maintains accreditation status in order to be deployed in Tairawhiti and support out of region responses if requested.

11. Tairawhiti CDEM Group has agreed that there is a need for NZRT capability to deliver specific services during a response. Any associated response risk will be managed by ensuring that the Tairawhiti CDEM Group NZRT meets the capability and capacity requirements of the NZRT National Accreditation Process, and that NZRT capability in the Tairawhiti must also be able to commit to a service level agreement with Emergency Management Tairawhiti for response services in the event of an emergency. To meet these objectives, the Tairawhiti CDEM Group must decide how to ensure that appropriate actions and investments are enacted to enable the establishment of a regional NZRT.

Introduction | NZRT Role and Accreditation Requirements

General Introduction to NZRT

12. NZRTs consist of volunteers who are representative of their community. They are recruited and trained to meet a standard that will enable them to be deployed to provide a response capability during an emergency.

13. It is generally accepted that with the impacts of climate change, New Zealand may be facing an increased number and intensity of severe weather events. Since early January 2021, New Zealand has experienced a series of extreme weather events, for which the Tairawhiti region has borne the brunt of several severe weather events. These national events resulted in the mobilisation of multiple NZRTs from across New Zealand to deploy into regions to support CDEM Groups. Tairawhiti was supported by an NZRT deployed from the Hutt Valley prior to the impact of Cyclone Gabrielle. In addition to extreme weather events, Tairawhiti is also exposed to tectonic risk (including earthquakes, liquefaction and tsunami), pandemic, industrial incidents, wildfire, and drought. These present a range of potential hazards and risks that will impact communities.

14. Where an emergency event escalates to a significant scale (affecting the whole region or multiple communities) resource gaps in response capacity will appear especially given the geographic spread and isolation of Tairawhiti communities.

Following on from a workshop with emergency management partners from the Tairawhiti CDEM Group in August 2023, it was agreed that an NZRT capability could be used to:

1) Provide a strategic regional capability that can be directly tasked by the ECC to meet directed response tasks that might otherwise be a lower priority for emergency services e.g. coordinating sandbag distribution and deployment, assisting with flood debris clearance, managing spontaneous volunteers.

2) A supporting capability that focuses on collaborative problem solving after the immediate initial response (fulfilling tasks that assist impacted communities in the initial hours/days following an emergency).

The need for NZRT capability in the Tairawhiti region was confirmed through a collaborative workshop held in March 2023 with Tairawhiti CDEM Group emergency services who presented their recommendation to CEG.

NZRT Benefits.

15. The benefits for the Tairawhiti Region

a. Assist first responder agencies by providing support as tasked if required.

b. Community ownership of the civil defence capability within the Tairawhiti Region by having a NZRT drawn from the community.

c. Provide a pool of trained personnel at short notice of response to support emergency services.

d. Enable a guaranteed response by not having the reliance on out of region NZRT's.

e. Using local knowledge within the community to enable access to support services to assist and enable a quick impact assessment and reconnaissance.

f. Provide guidance and management for non-trained spontaneous volunteers drawn from the community at short notice.

g. Provide leadership and support for Community Response Teams in major incidents where local resources are overwhelmed or need supplementing.

Key Stakeholders

Stakeholder	Interest and Influence

Group Controller	Represents the Tairawhiti Civil Defence Emergency Management (CDEM) Group and maintains high level of interest to ensure that the regional NZRT will continue to meet outputs and training courses to produce trained and accredited personnel who are resourced to maintain the outputs of the team.
Mayor and GDC CEO	Represents the Gisborne District Council and maintains a high level of interest in that the NZRT is established to provide CDEM response within the region. Ownership of the local NZRT capability will be with GDC as the governing entity.
Tairawhiti Emergency Management – NZRT Team Manager	Represents the Controller and maintains high level of operational readiness, engagement, and morale across the team. Provides the administration and support requirements for the team including training and compliance.
Tairawhiti Communities	Volunteers are drawn from the community and the NZRT capability is a visible group of trained volunteers who can assist with providing a level of CDEM assurance within the region.

Project Team. Once approval has been granted for the establishment of a project team will be setup to lead the establishment, recruitment and training of the team. The team will consist of:

a) Group Controller

b) TEMO – NZRT Team Manager

c) NEMA – NZ Response Teams Secretariat (SME Advisor)

Critical Success Factors	Broad Description
NZRT Certification	This will be achieved by the NZRT reaching a level of competency and accreditation so as to be deployed by the Tairawhiti CDEM Group to enable it to function in support of an emergency response.
Trained Personnel	Personnel are selected and trained to a high standard in order to perform their role within the NZRT both in support of regional deployments and if requested, out of region deployments. .
Equipment	This will be achieved by the NZRT being equipped to meet the role requirements and outputs.

Establishment Three Year Plan

16. Based on other regional groups being established, the intent would be to raise and train a NZRT to obtain certification within three years in order to meet all the outputs for the team. A three-year plan involves raising and training the minimum of 3 x seven person teams, along with a two person command team in order to achieve certification by NEMA.

17. It is assessed that three years would be the minimum time to adopt a managed approach to raising and training a NZRT. This will enable a nucleus of personnel to be recruited and allows for a two year period to develop all the support requirements and a training routine in preparation for certification in the third year. This plan would be flexible to enable certification to be brought forward should indications be that the NZRT is at a suitable trained state prior to the third year.

FINANCIAL CASE: ASCERTAINING AFFORDABILITY AND FUNDING REQUIREMENTS

1. It is anticipated that the establishment, training and sustainment of an NZRT within Tairawhiti will be funded by a combination of the following;

   a. National Emergency Management Agency. Funding training.

   b. Tairawhiti emergency management funding. (Capital expenditure as a set up cost and annual operating costs.)

   c. Community contributions and grants.(Assist with operating costs)

18. The funding model will be based on the establishment of a core group that can form three teams of 7 each. This will allow for the team to be task organised to be able to deploy into 2 events with the 3rd team providing a standby reserve.

19. **It is recommended that the funding model can be fully confirmed by visiting established NZRT teams and confirming the model that will be suitable for Tairawhiti.**

20. **Finance Option.** The Selwyn District plan used for the establishment of their team to determine the recommended funding structure for the team. This may include:

   a. Establish and register as a non-profit making Charitable Trust.

   b. Establish and maintain financial records.

   c. Establish and appoint a Treasurer position.

   d. Establish and appoint a Fund Raiser position that will also include sponsorship opportunities.

e. Investigate funding options Gisborne District Council (likely to require synchronising with the LTP).

Milestones/Timeline

21. The outline plan that will seek to establish an NZRT team that will consist to 3 deployable groups within three years are:

a. Year One Milestones (FY24/25)

i. Project team established.

ii. Recruitment commences to commence development of roles and functions with the team.

iii. Standard Operating Procedures and Training Plan developed

iv. Funding and procurement systems established.

v. Training activities commences for:

1. Foundation Skills

2. Welfare Needs Assessments

3. Response to Floods

b. Year Two Milestones (FY25/26)

i. Commence individual and collective training program.

ii. Recruitment continues.

iii. Procurement of specialist equipment continues.

iv. Training activities focus on:

1. Storm Response

2. Setting up and supporting a Community Led Welfare Centre

v. Collective Training including working with Emergency Services (support role only as tasked)

vi. Scope the establishment of community NZRT elements into the West and East. Training and accreditation will mirror the timeline used for establishment of these teams.

vii. Preparation for accreditation by NEMA (Year 3)

c. Year Three Milestones (FY26/27)

i. Commence accreditation assessment (NB. Depending on trained state of the team, this may be achievable in Q4 of Year Two)

ii. Collective and individual training (including attendance with out of region groups)

iii. Achieve fully accredited status as a certified NZRT that can be deployed in region and for out of region responses.

Te Kaunihera o Te Tairāwhiti
GISBORNE
DISTRICT COUNCIL

24-219

Title: **24-219 Group Manager Report**

Section: Civil Defence Emergency Management

Prepared by: Ben Green - Civil Defence Emergency Manager

Meeting Date: Tuesday 3 September 2024

Legal: No	Financial: No	Significance: **Low**

Report to CIVIL DEFENCE EMERGENCY MANAGEMENT GROUP/KAIWHAKAHAERE OHOTATA WHAKAMARU TŪMATANUI for decision

PURPOSE - TE TAKE

The purpose of this report is to update on Civil Defence Emergency Management (CDEM) Group activities since 22 May 2024.

SUMMARY – HE WHAKARĀPOPOTOTANGA

The report provides updates for the period that include:

- Tairāwhiti Emergency Management Group (TEMO) update.
- Operational updates.
- National Emergency Management Agency (NEMA) update.

The report includes an update on the review of the Tairāwhiti CDEM Group Plan and seeks endorsement from the CDEM Group of the direction being taken.

The decisions or matters in this report are considered to be of **Low** significance in accordance with the Council's Significance and Engagement Policy.

RECOMMENDATIONS - NGĀ TŪTOHUNGA

That the Civil Defence Emergency Management Group/Kaiwhakahaere Ohotata Whakamaru Tūmatanui:

1. **Endorses the proposed concept emergency management framework as the basis for a draft of the new Tairāwhiti Civil Defence Emergency Management Group Plan.**

Authorised by:

Nedine Thatcher Swann - Chief Executive

Keywords: CDEM, civil defence emergency management, TEMO, Tairawhiti emergency management group, operational updates, NEMA, national emergency management agency

BACKGROUND - HE WHAKAMĀRAMA

1. The period for this report covers 8 April to 17 July 2024. The seasonal weather events have seen the activation of the emergency centre given the rainfall amounts in the flood catchments. There has been a lot of engagement in the readiness space.

TAIRĀWHITI EMERGENCY MANAGEMENT OFFICE (TEMO) GENERAL UPDATE

Te Taituarā Local Governance Excellence Award

2. TEMO took home the inaugural Member's Choice Award for the Tairāwhiti Civil Defence Common Operating Picture (COP) Intelligence Dashboard. The national award recognises the innovative digital platform which revolutionises situational awareness and enhances capabilities during emergencies. By seamlessly integrating real-time data and geospatial mapping, the Tairāwhiti Emergency Management COP Intelligence Dashboard empowers users with critical insights and decision-making tools, significantly improving response activities. The Member's Choice Award is a new category introduced this year. Taituarā received a record 54 Excellence Award entries from across the country with which they asked members to vote for their overall favourite. Press release Member's Choice Award for Cutting-Edge Emergency Management Solution. Recognition for the award included acknowledgement from local Tairawhiti MP's and Minister for Emergency Management and Recovery, Rt Hon Mark Mitchell. **(Attachment 1)**

Local Government New Zealand (LGNZ) SuperLocal awards

3. LGNZ Superlocal Awards recognise and celebrate excellent performance by councils across New Zealand in leading their communities and working together. As part of the 2024 LGNZ Superlocal Awards, TEMO have two projects that have been selected from across the country as finalists in categories which is an achievement. The category award winners will be announced on Friday 23 August in Wellington. TEMO has two projects in the following categories:

    - **SuperIdea Award**. 'For those who think outside the box. The SuperIdea Award will go to a breathtakingly clever solution to an age-old cultural, social, economic, or environmental problem in the community'. TEMO selected as a finalist for the **Tairāwhiti Civil Defence Emergency Management Common Operating Picture (COP) Platform**.
    - **SuperCollab Award.** Recognises 'innovative collaboration or partnership that's delivered a brilliant outcome – one that's had a significant positive impact on all or part of a community's social, economic, environmental and/or cultural wellbeing'. TEMO has been selected as a finalist for **Tairawhiti Marae Emergency Preparedness and Resilience Project.**

Washington State, USA Visit 26 April – 8 May

4. Ben Green travelled as part of a five-strong delegation from New Zealand who visited Washington State from 26 April to 8 May. Sponsored by the Massey University Joint Centre for Disaster Research (JCDR) in Palmerston North, the delegation included their experts and members of the Te Rūnanganui o Ngāti Porou Taiao team. The group met and spent time with indigenous First Nation tribes on the coast of Washington State and with Washington State Emergency staff.

5. The Washington State coastline is in the vicinity of the Cascadia Subduction Zone, which has a similar risk exposure to Tairāwhiti from the Hikurangi Subduction Zone. Both regions face catastrophic risk exposure to earthquake and tsunami.

6. The group visited Shoalwater Bay, Quinault and Makah First Nation tribes and also toured the 30-metre-high Auntie Lee Vertical Evacuation Tower in Tokeland. At $6.5million USD, the structure is sited to provide for vertical evacuation given there are no evacuation options for the community which sits at 2 metre above sea level. It was also notable that managed retreat away from the coast is in the active phase of funding and planning for several of the Indian reservation communities. Whilst Tairāwhiti doesn't have access to the scale of funding that the Washington State tribes have, hills in the region provide vertical evacuation for a majority of the region less the high risk is in the urban built-up areas.

7. The critical risk-based planning and resourcing that has been instigated across Tairāwhiti communities in the past 3 years is extensive and exceeds the resources evident for the areas that were visited however, Washington State encompasses 39 counties/wards, 29 tribes, 281 cities and towns and 7.6 million people.

First Nations representatives of Washington State meet their Kiwi visitors, including Tairāwhiti Emergency Management Group manager Ben Green and members from the Joint Centre for Disaster Research (JCDR) from Palmerston North, in Washington State, USA.

Tairawhiti Emergency Management Office – Resourcing the Region for Emergencies

8. The Tairāwhiti Marae Emergency and Preparedness Project was fully implemented at the end of 2023. Developed and implemented as a regional initiative aimed at enhancing the disaster response and recovery capabilities of marae clusters in the Tairāwhiti region. This project is a joint effort between Tairāwhiti Emergency Management, Te Kaunihera o te Tairāwhiti - Gisborne District Council, and Toitu Tairāwhiti. The primary goal was to equip marae clusters with the necessary resources and plans to be prepared to lead their own response for significant emergency events.

9. A key success of the project was the joint funding and contribution across a number of partners and agencies who contributed financial support, knowledge and equipment needed to implement comprehensive emergency preparedness plans for marae clusters across Te Tairāwhiti.

10. Community resilience plans are central to the project developed in partnership with hapū and whanau groups across Tairāwhiti. These plans are tailored to address the specific risks and hazards associated with natural emergencies in different community areas. The development process involved close coordination with emergency service organizations and NGOs, ensuring a thorough understanding of regional hazards. Community input was gathered through hui conducted at the hapū and marae levels, ensuring that the plans reflect the needs and perspectives of whānau, marae, and hapū.

11. The inclusive approach to community engagement has been a cornerstone of the project. By involving representatives from whānau, marae, and hapū across Tairāwhiti, the project has ensured that the funding, resources, and subsequent plans are truly representative of the region's diverse communities. The broad endorsement from all iwi that initiated the project Tairāwhiti highlights the collective commitment to enhancing disaster preparedness.

12. The project aims to support marae clusters by providing them with the necessary emergency capabilities to implement community-based disaster support systems. This is particularly crucial given the catastrophic hazards and risks faced by the remote areas of the Tairāwhiti region. In the event of a natural disaster, hapori (communities) will find themselves isolated and needing to rely on their own resources and preparedness.

13. The Tairāwhiti Marae Emergency and Preparedness Project represents a significant step forward in building community resilience against natural disasters. Through joint efforts, comprehensive planning, and inclusive community engagement, the project aims to ensure that marae clusters are well-equipped to respond to and recover from emergency events. This initiative not only enhances the safety and preparedness of the Tairāwhiti region but also serves as a model for community-based disaster resilience efforts.

14. TEMO has spearheaded the project inception and management, aiming to enhance community capability through regional resource deployment. Currently, Phase 2 is underway for 2024, building on the achievements of Phase 1 in 2023. Once complete, this will equip over 30 community sites in Tairāwhiti with $2.4 million worth of specialist equipment which is separate to central funding grants provided as part of other initiatives. As a result, Tairāwhiti will be one of the most well-resourced regions in Aotearoa.

Phase 1 - Marae Emergency and Preparedness Project (Completed December 2023)		Phase 2 – Better Off Community Project (active project to be completed December 2024)	
Muriwai	Manutuke	East Cape Lighthouse	Motu
Te Karaka	Whangara	Te Puia Springs	Tikapa
Tokomaru Bay	Tikitiki	Mangapapa urban	Whatatutu Rural
Anaura Bay	Rangitukia	Reporua	Kanakanaia
Uawa (South)	Wharekahika	Manutuke #2	Ormond
Uawa (North)	Te Araroa	Ngatapa	Matawai
Tiniroto	Waipiro Bay	Patutahi	Riverside Road
		Makorori	Ormond
14 Community Sites resourced 2023		16 Community sites (at present) to be resourced for 2024	

Regional Heavy Rain Event 26 June

15. While this event did not trigger a local emergency declaration, the threshold for voluntary evacuations were met in the Te Karaka catchment and areas in the Waipaoa catchment as well as some residents in the Ferguson Drive area. Heavy rain and severe gale force winds over 48 hours produced surface water in low lying areas, road closures, fallen trees and power outages in pockets of the regional power grid. The unfortunate prelude to the weather system which saw the loss of three lives at sea whereby the emergency services and NZDF operated in very challenging conditions undertaking the search and rescue effort.

16. Demands for emergency response and welfare was very low and reflects the level of awareness and preparedness that the community initiates for incoming weather and that the river levels that didn't reach flood heights. While river levels were at critical levels, these peaked and did not exceed these which would have resulted in forced evacuation of properties. The ECC was activated from 25-26 June in lite mode configured for flood response. ECC stood down and reverted to duty system on 26 June.

Alternate National Controller Appointment

17. Following a national selection process, Ben Green has been selected as an Alternate National Controller for NEMA. This role will be an extraordinary appointment held in conjunction with the current role of the Tairawhiti Group Manager and Group Controller and reflects the national focus on growing and enhancing the national emergency management system which also includes the ability to activate the Alternate National Crisis Management Centre in Auckland.

Emergency Management Bill Update

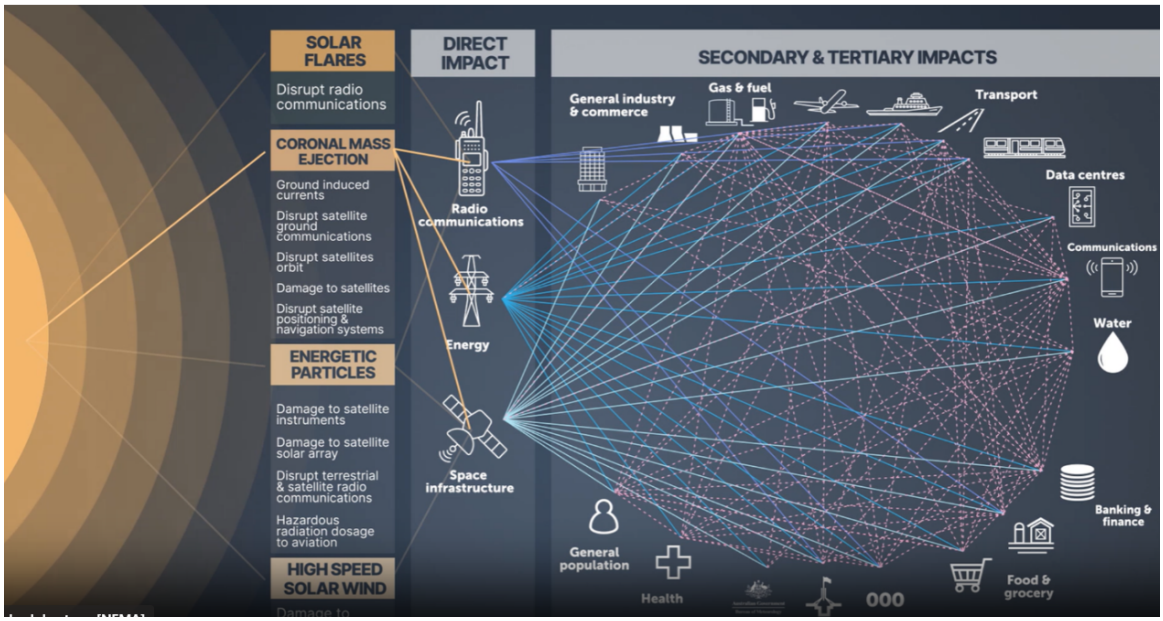
18. The New Zealand Government has decided not to proceed with the existing Emergency Management Bill. Instead, the Minister plans to introduce a new Bill during the current term. This decision was made to allow for system improvements using existing mechanisms in the Civil Defence Emergency Management Act 2002 and non-legislative measures.

19. The previous Emergency Management Bill, which aimed to update the legal and regulatory framework for emergency management in New Zealand, was discharged from Parliament on May 8, 2024. The new Bill is expected to address similar goals, such as enhancing community preparedness, recognizing the role of Māori in emergency management, and improving the resilience and accountability of critical infrastructure. Letter from Dave Gawn, NEMA CE to Regional CDEM Groups **(Attachment 2).**

Space Weather

20. NEMA has been appointed as the lead agency for space weather which is primarily caused by solar activity such as solar flares and coronal mass ejections. Space weather poses several risks to New Zealand, and it has been included into NEMA's newly established Space Weather Program with a view to developing an all of government approach for response. The main hazards from space weather include:

    - **Geomagnetic Storms:** These can induce electrical currents in power grids, potentially causing outages and damaging infrastructure.
    - **Satellite Disruptions:** Space weather can interfere with satellite operations, affecting communication, navigation, and weather forecasting systems.
    - **Communication Interruptions:** High-frequency radio communications can be disrupted, impacting aviation and maritime operations.
    - **Navigation System Errors:** GPS signals can be degraded, affecting various sectors that rely on precise positioning.
    - New Zealand's national risk register includes space weather due to its potential impact on critical infrastructure and services. Efforts are ongoing to improve forecasting and mitigation strategies to enhance resilience against these hazards.



Space Weather event based impacts

21. Given the relatively recent focus and awareness of space weather risks, CDEM Groups will seek to undertake risk assessments and consequence-based planning, such as for widespread power outages. This will include the 'Get Ready' public education campaigns to emphasise the importance of preparedness, subscribing to receive space weather alerts for situational awareness from the above international space weather centres via their respective websites. Space Weather information sheet **(Attachment 3)** Interim Space Weather Response Plan **(Attachment 4).**

Review of Tairawhiti CDEM Group Plan

22. The review of the Group Plan has been underway for some time and has suffered interruptions and delays due to emergency events and changes in personnel.

23. Work has started in earnest on drafting the document and a draft concept of a proposed emergency management framework has been prepared for discussion with the CDEM Group. This would form the foundation of the new Group Plan. The **attached** report provides detail.

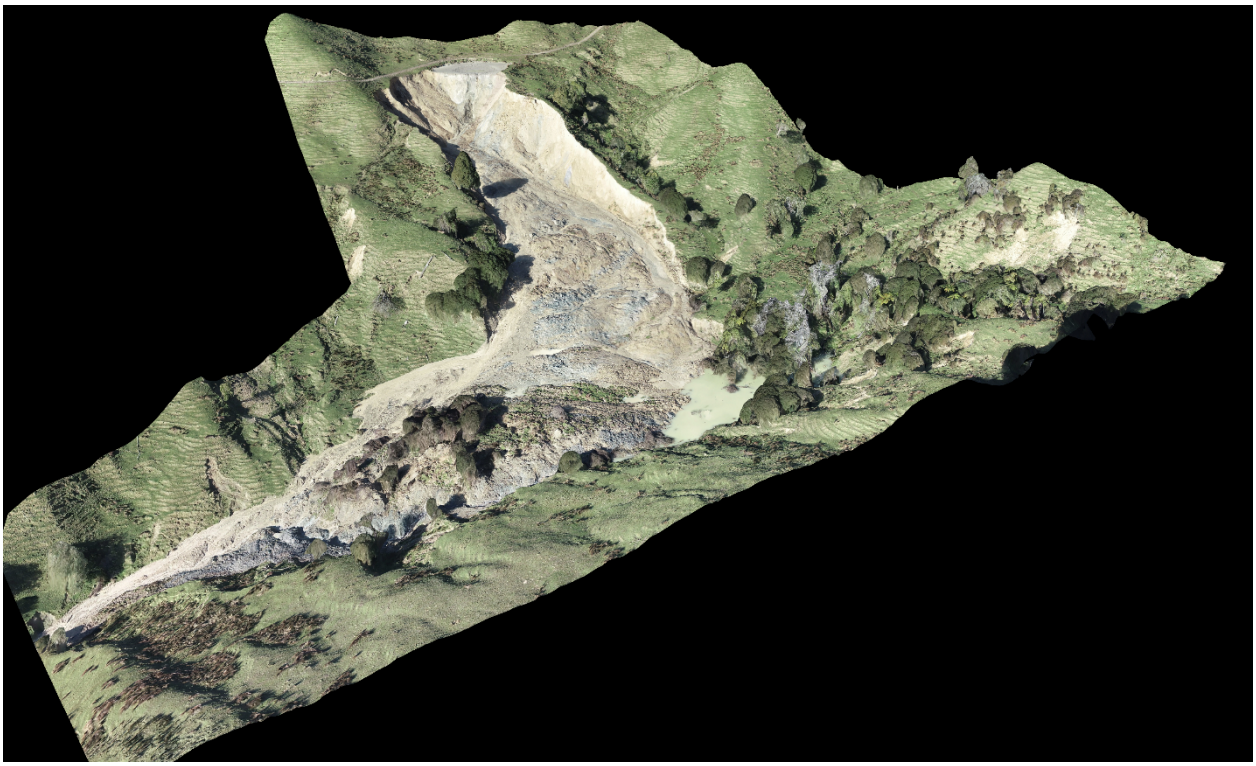
Principal Scientist Report

Bushy Knoll and Te Kuri a Paoa/Young Nicks Head landslides

24. Two very large landslides occurred after the 24 – 26 June 2024 storm.

25. The first of these occurred close to Bushy Knoll Road. This was initiated as a subtle tension crack surrounded by landslides during Cyclone Gabrielle which expanded somewhat in the June 2023 storm but then failed during the June 2024 storm with the head scarp regressing up hill. The landslide then failed again on the 22nd of July during a minor storm. Analysis of drone mapping indicates a significant volume of sediment primed to fail estimated at c.90,000 tonnes. If it does fail, there is a high risk of a debris being generated which may reach the bridge on Elmers Road which was already damaged during Cyclone Gabrielle. Despite there being a stock pond at the head of the landslide, this is considered coincidental as the landslide started well below the stock pond and regressed upslope over time with the stock pond only breaching in July.

26. The drone-based 3D model of the landslide is shown below.

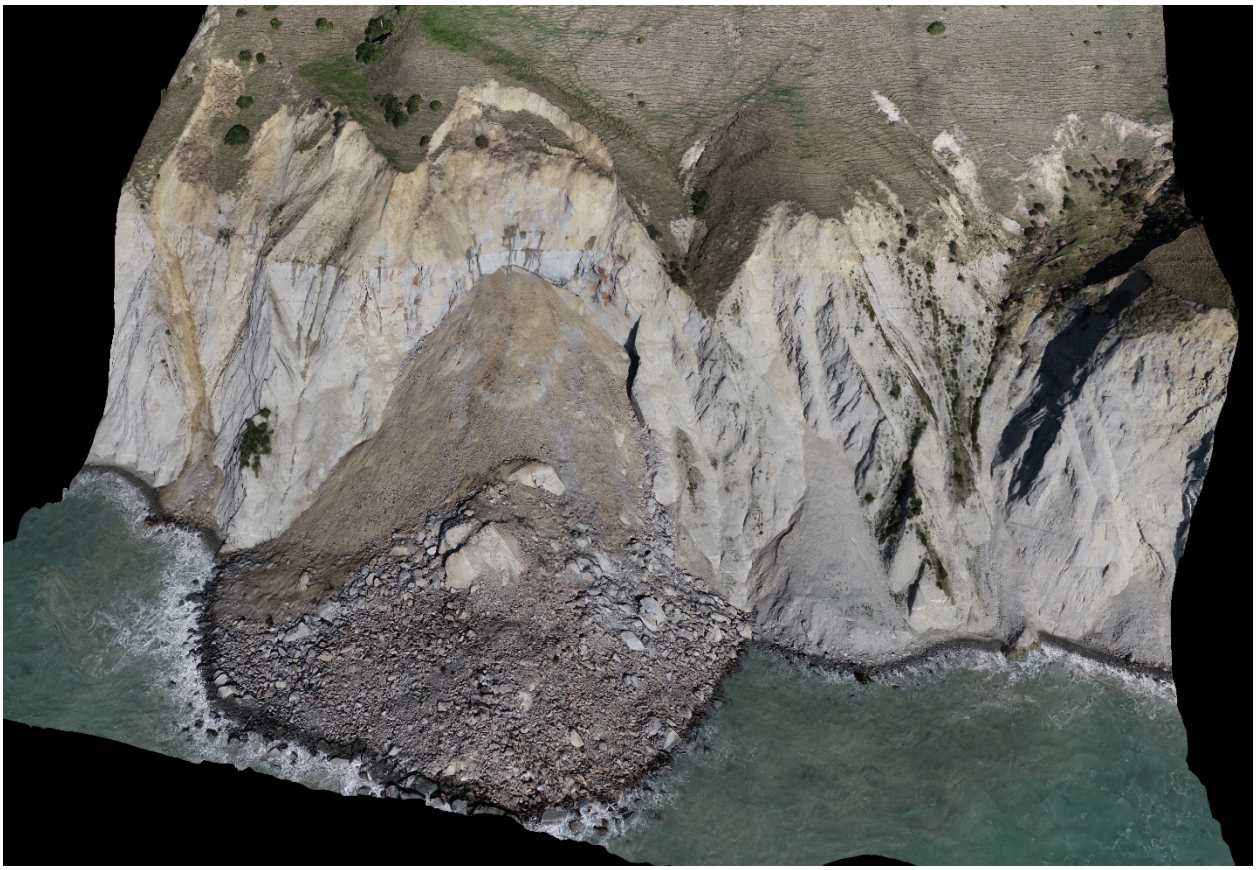


27. The second landslide occurred on Young Nick Station/Te Kuri a Paoa in August 2024. There were no prior indications of failure being imminent, but the landslide is significant because of its scale and similarity with the Cape Kidnappers landslide of 2019. The amount of material that failed is estimated at 140,000 tonnes or more.

28. Immediate advisories were issued for both landslides, and a hui was held at Tamanuhiri Marae at Muriwai to discuss the implications with the local community. A closure of access to the shore around the landslide has been put in place and signage has been installed. A site visit from Young Nicks Station indicated several fragile slopes and a closure of the ridgeline area will be extended beyond the end of lambing season. Information of the failure is also being provided to the American-based owners of Young Nicks Station.

29. A drone-based 3D model of the Te Kuri a Paoa landslide is shown below. A key feature of the landslide is the volume of perched material at the headscarp of the landslide, ancillary smaller landslides and large perched unstable rock masses obvious on the right-hand side of the image.

30. The occurrence of two very large-scale landslides during relatively minor storm events nearly a year and a half after Cyclone Gabrielle is concerning. It suggests that the terrain of the Gisborne/Tairawhiti region remains fragile, and the possibility of further large-scale Gabrielle related events cannot be ruled out. For Te Kuri a Paoa we plan to undertake drone-based mapping of the ridgeline to determine the risk of further failures, and a LiDAR survey will also be undertaken.



Smaller post-June 2024 storm instability

31. Several smaller scale failures have occurred following the June 2024 storm. One in the Matokitoki Valley area resulted in a dwelling being red stickered due to ongoing rockfall and landslide risk while a large landslide initially triggered in the November 2021 storm has reactivated. Slumping at a Category 3 Waimata River property has now migrated laterally to the adjacent property which also came close to being inundated during the June 2024 storm. Lateral erosion occurred adjacent to some other Waimata river properties but presently have not encroached beyond riverside reserve land.

32. Elsewhere the storm surge associated with the June event has caused erosion particularly at Whagara close to the urapa and at the south end of Tolaga Bay close to the motor camp. Both sites are being monitored.

Regional Hazard Risk Management Group Meeting In Gisborne

33. The regional sector hazard risk management specialists and CDEM advisors meet as a collective generally twice a year to share knowledge and to learn about new initiatives as well as receive reports from key external stakeholders. On November 13th this year the meeting will be held in Gisborne with a fieldtrip on the following day which will allow practitioners from areas remote from the impacts of Gabrielle to visit flood and landslide affected sites.

Review of the Flood Warning Manual and Flood Survivability study

34. As part of the post-Gabrielle science response funded by MBIE, Council undertook two studies with NIWA.

35. The first of these was an independent review of the Flood Warning Manual and how it is implemented during an event. The conclusions/recommendations are listed below, and the full report is appended;
    - Provide greater imperative to the FWO {Flood warning Officer] role by stipulating in the manual the requirement for FWO duties to take priority during incident response.
    - Provide guidance for resource upscaling when event magnitude (spatial and/or temporal) escalates.
    - Clarify the roles and responsibilities of FWOs and other staff involved in incident management, including what people *are* and *are not* responsible for and how the roles interact.
    - Make the manual a dynamic document: require post-event updates to the manual, make the manual more impact focused.
    - Ensure that current and future FWOs have the necessary core competencies.
    - Ensure that current and future FWOs have the appropriate support and opportunity to attend required training.
    - Align the flood warning manual with national approaches to flood management: this item will likely need to be dynamic through time and will be informed by the outcomes of work to review Regional Council and Unitary Authority flood procedures across New Zealand as well as any updates to the CIMS framework into the future.

36. A new initiative from the Flood Warning Steering Group supported by a Nema Resilience grant around FWO training modules will help address some of the recommendations but others will require some work by Council.

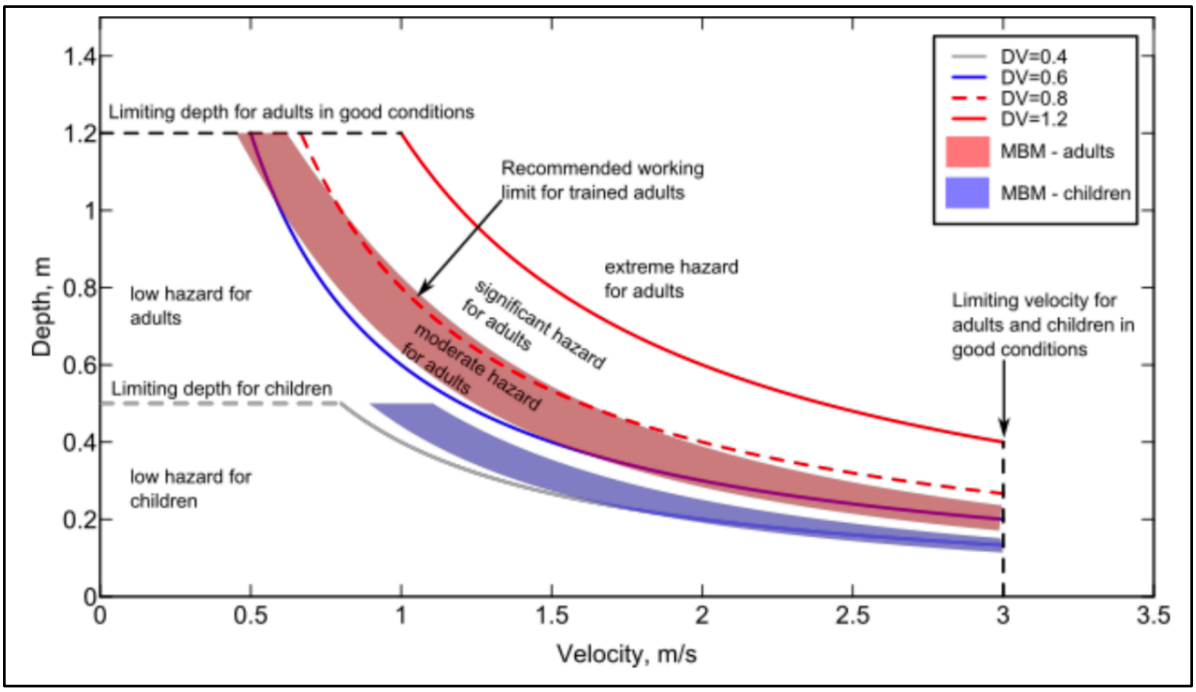
Flood Survivability study

37. While the Gisborne/Tairawhiti region was fortunate in having only one direct flood related death that is still one too many and during interviews in the subsequent months we found that there were many close calls. In addition, during the subsequent Future of Severely Affected Lands (FOSAL) assessment process the lack of suitable guidance to assess future flood risk was a gap and on an interim basis, the Queensland Guidance was adopted. This was not ideal as the character of flooding in Australia in general was difference to our region particularly around the lack of advanced warning that a flood would occur and thus the community's collective behavioural response to a flood event and evacuation imperatives is also different. Overall, it was found that there was a reasonable degree of confidence in using the international methodology to determine risk but with some variance when accounting for the difference between New Zealand health statistics and the international cohorts (refer to Figure below). This could be improved by using more regionalised and community-based health statistics, but this would require a greater degree of investment in the risk assessment and would involve ethics issues around collecting and using more targeted health statistics.

38. Another factor that could not be considered in the study was associated with the behavioural responses at a community level when the need to evacuate arises. An example is the impact of socio-economic factors on decision-making at a family-whanau level.

39. Secondarily, what would change to the behavioural response for subsequent events when different factors may be in play, for example, would raising houses above Gabrielle flood heights lead to complacency during an event and result in people sheltering in place when evacuation remains the best option.

40. Aligned with this are the climate change effects on flood heights and impact of aggradation in the Waipaoa which could exacerbate subsequent flood heights. This may result in the need for a greater need to rescue people who have sheltered in place and then been unable to evacuate when flood waters reach a higher level and/or greater velocity than occurred in Gabrielle.

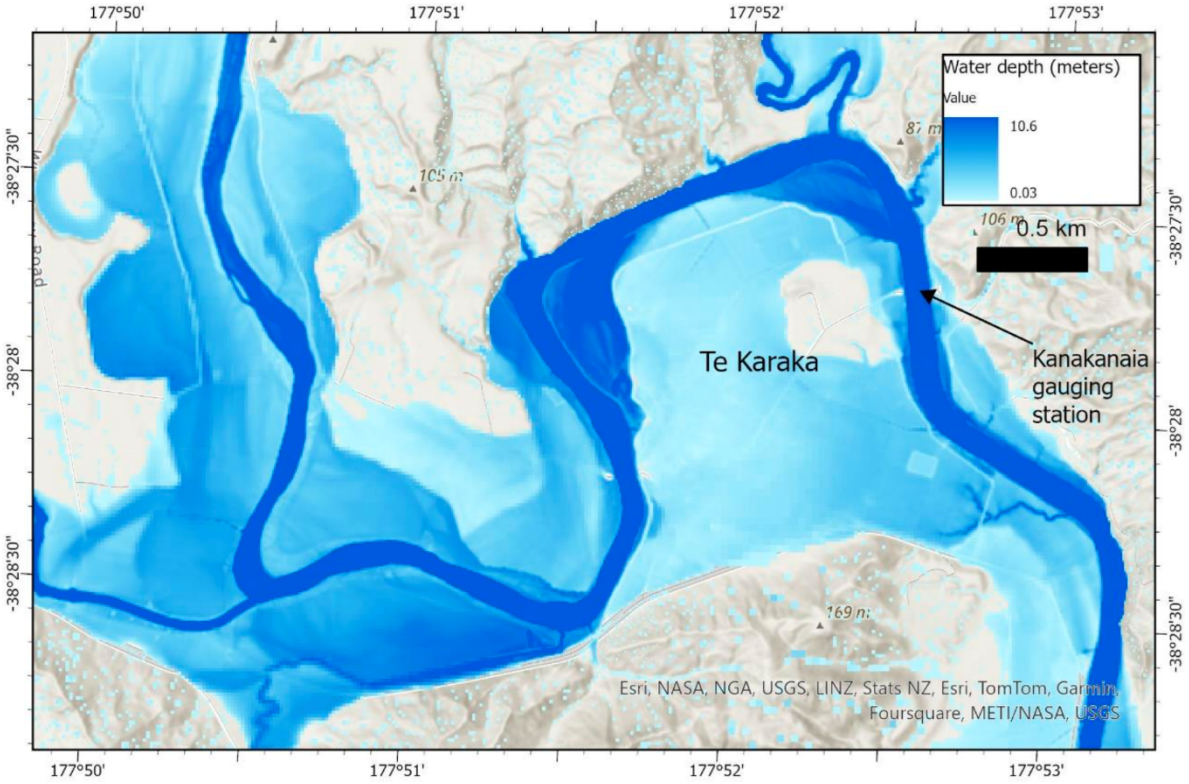


41. The fundamental question is while raising houses increases the survivability of dwellings, the impact on survivability on people needs to be assessed further.

42. A RiskScape based evacuation model for Te Karaka was developed to test the findings of the assessment.

43. In essence, this established that the present formal evacuation site on Cranswicks hill still provides the best mitigation to threat to life from a flood event. While an alternative within Te Karaka may have been safe during Cyclone Gabrielle it lacks suitable freeboard to ensure reduced threat to life in a future event where aggregation in the Waipaoa and a storm of different character may result in a greater flood height (refer to Figure below). Cyclone Gabrielle was a short duration event, but we know that Cyclone Bola in 1988 was a

more sustained event because of the cyclone stalling. In short Gabrielle may not be the most suitable scenario for determining worst case flood heights and duration.



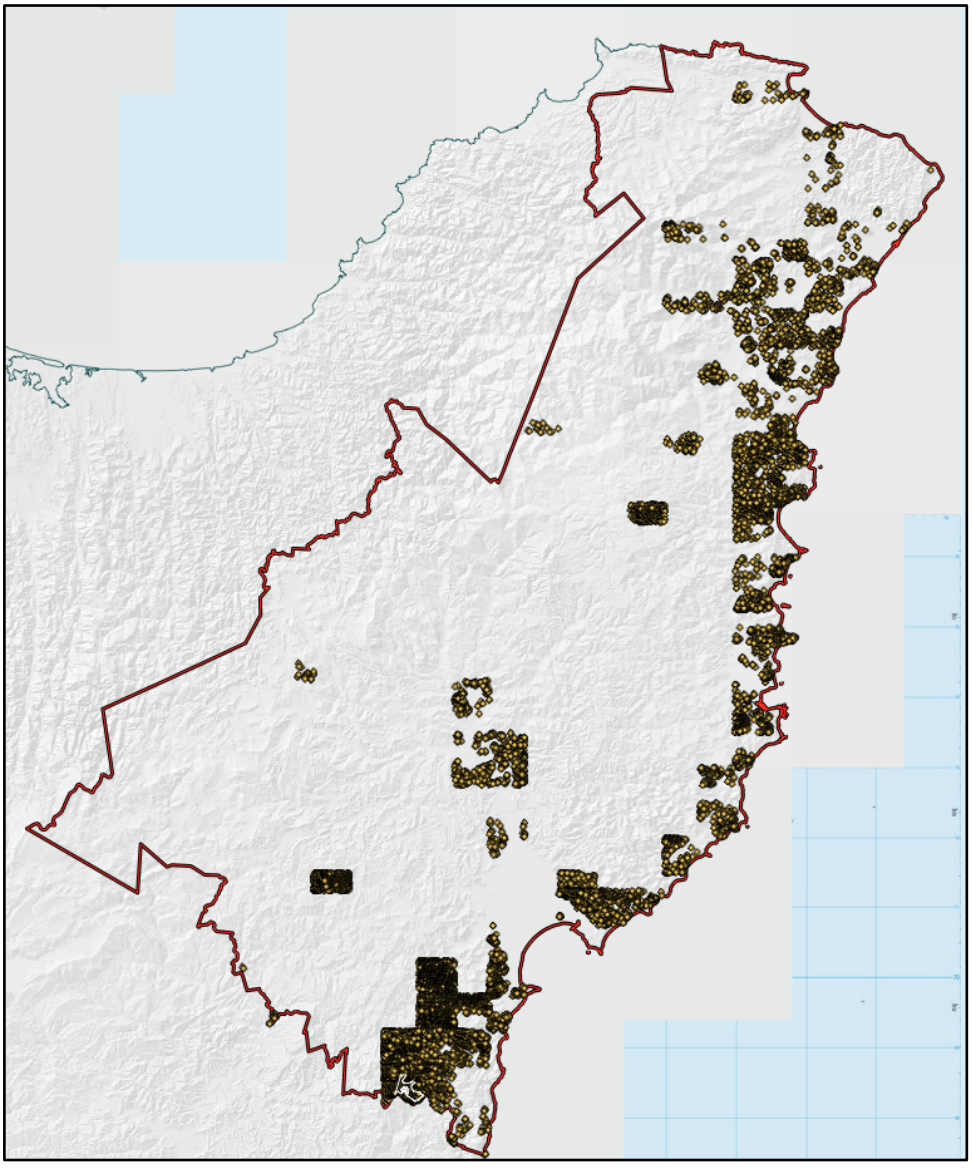
NIWA Flood Frequency analysis

44. This project was not initiated by Council but was commissioned by MBIE soon after Cyclone Gabrielle. Our River engineers and hydrologists have been actively engaged with the project, however, to ensure that the project generates outcomes that are of value to Council. The conclusions of the study are as outlined below;
    - The results of the statistical analysis indicate that the time series of annual maximum flood peaks at sites across the Tairāwhiti region are stationary and serially independent.
    - In most cases, the Generalised Extreme Value (GEV) distribution provides the best fit for modelling annual maximum flood peaks and their corresponding return periods at site.
    - It is important to note that the 2023 flood event introduced significant uncertainty, not only in the estimation of the flood peak magnitudes but also in the associated return period calculations.
    - Given the distinct nature of events like the 2023 flood, a regional curve can be a valuable tool for determining return periods, offering an alternative approach to traditional at site flood frequency analysis. Predictions obtained at a site should be considered in the light of those from the regional curves along with those from other studies.
    - A before and after 2023 comparison of the regional curves could be carried out in future, and comparison of the estimated 2023 return periods using the before and after regional curves, to see if the uncertainties of the at-site results are reduced.
45. The Generalised Extreme Value (GEV) distribution emerged overall as the most suitable model overall for estimating annual maximum flood peaks and their corresponding return periods. The results of this study were that the median return period of the Tairāwhiti Cyclone Gabrielle floods was around 50 years for the 17 records assessed.

46. I key conclusion is that the 2023 flood caused by Cyclone Gabrielle was not the largest in the systematic record for many sites. Cyclone Bola (1988) featured as the maximum for some sites, and other non-cyclone years were maximum for other sites.

Post Gabrielle Landslide mapping by GNS

47. Following Cyclone Gabrielle, MBIE engaged GNS to map landslides in the affected areas including Gisborne/Tairawhiti. Unfortunately, the mapped landslide coverage within our region was limited with a coverage of between 12 and 15% achieved and GNS do not plan to complete regional mapping of Gabrielle landslides (see figure below). Around 26700 landslides were mapped but this cannot be considered representative of the number and scale of landslides that occurred. Council has so far mapped an additional 25,000 landslides but combined this only represents around 25% of the region. Thus, it is anticipated that when the Council analysis of landslides is completed it would not be surprising that over 100,000 landslides can be attributed to Gabrielle within the region.



NEMA REPORT

48. Ian Wilson, Regional Emergency Management Advisor (REMA) for Tairāwhiti report attached **(Attachment 5).**

DISCUSSION and OPTIONS - WHAKAWHITINGA KŌRERO me ngā KŌWHIRINGA

49. The period for this report covers 8 April to 17 July 2024. The seasonal weather events have seen the activation of the emergency centre given the rainfall amounts in the flood catchments. There has been a lot of engagement in the readiness space.

ASSESSMENT of SIGNIFICANCE - AROTAKENGA o NGĀ HIRANGA

Consideration of consistency with and impact on the Regional Land Transport Plan and its implementation
This Report: **Low** Significance

Impacts on Council's delivery of its Financial Strategy and Long Term Plan
This Report: **Low** Significance

Inconsistency with Council's current strategy and policy
This Report: **Low** Significance

The effects on all or a large part of the Gisborne district
This Report: **Low** Significance

The effects on individuals or specific communities
This Report: **Low** Significance

The level or history of public interest in the matter or issue
Overall Process: **Low** Significance

50. The decisions or matters in this report are considered to be of **Low** significance in accordance with Council's Significance and Engagement Policy.

TANGATA WHENUA/MĀORI ENGAGEMENT - TŪTAKITANGA TANGATA WHENUA

51. Various training and engagement have been ongoing within the region as part of the operational roll out of the emergency resources for marae in the rohe.

COMMUNITY ENGAGEMENT - TŪTAKITANGA HAPORI

52. Community engagement as part of readiness and outreach has been busy for the period and continues to see new community groups self-organising into the emergency management regional framework. This includes the connection with the ethnic groups via the Tairawhiti multi-cultural council.

CLIMATE CHANGE – Impacts / Implications - NGĀ REREKĒTANGA ĀHUARANGI – ngā whakaaweawe / ngā ritenga

53. The climate modelling undertaken for Council suggests that Tairāwhiti can expect the intensity and frequency of extreme and severe weather events as we have experienced over the past 2 years to increase in the future.

CONSIDERATIONS - HEI WHAKAARO

Financial/Budget

54. The contents of this report do not deal with financial matters.

Legal

55. The contents of this report do not deal with legal matters.

POLICY and PLANNING IMPLICATIONS - KAUPAPA HERE me ngā RITENGA WHAKAMAHERE

56. There are no potential policy implications associated with this report.

RISKS - NGĀ TŪRARU

57. There are no potential risks or policy implications associated with this report.

ATTACHMENTS - NGĀ TĀPIRITANGA

1. Attachment 1 - 2024.06.19 Hon Mark Mitchell - Ben Green [**24-219.1** - 1 page]
2. Attachment 2- NEMA CE Announcement Emergency Management Bill 4 April [**24-219.2** - 1 page]
3. Attachment 3 - Space Weather Information Sheet - August 2024 [**24-219.3** - 2 pages]
4. Attachment 4 - Interim New Zealand Space Weather Response Plan v 1.1 pdf [**24-219.4** - 17 pages]
5. Attachment 5 - NEMA Update Tairawhiti CDEM JC Sept 2024 [**24-219.5** - 2 pages]
6. Attachment 6 - 2024070 CH GDC Flood Evacuation Survivability Study [**24-219.6** - 38 pages]
7. Attachment 7 - 2024071 CH GDC Flood Warning Manual Review [**24-219.7** - 31 pages]
8. Attachment 8 - Review of Tairawhiti Civil Defence Emergency Management Group Plan [**24-219.8** - 6 pages]

Hon Mark Mitchell

Minister of Corrections
Minister for Emergency Management and Recovery
Minister of Police

19 June 2024

Ben Green
Group Manager
Tairāwhiti Emergency Management Office
By email: Ben.Green@gdc.govt.nz

cc. Rehette Stoltz
Mayor of Gisborne

cc. Nedine Thatcher Swann
Chief Executive
Gisborne District Council

Dear Ben,

I am writing to acknowledge your recent Member's Choice Award at the Taituarā Excellence Awards 2024 recognising exceptional achievement in civil defence emergency management (CDEM). I am delighted to see you voted by your peers as inaugural winners of this award and to see your outstanding contributions celebrated by the Local Government community.

As Minister for Emergency Management and Recovery, I am eager to see continued progress in the emergency management system toward improved shared situational awareness. This award spotlighting your innovative Tairāwhiti Civil Defence COP Intelligence Dashboard is an excellent example of solutions that can improve decision-making and response capabilities for CDEM Groups and local communities during times of great need.

I would like to thank you and your project team, particularly Kumeroa Papuni-Tuhaka and Orlo Dennison, for your leadership in this critical area, and for your service to CDEM and your communities in Tairāwhiti. I particularly recognise that severe weather events have seen you called on more than many in recent years. Your ongoing commitment and dedication are appreciated by the New Zealand Government.

Please convey my thanks and congratulations to all those who participated in and supported this project, and to those closest to you who no doubt support and enable your valuable service to your communities.

Well done Ben, outstanding result.
Mark.

Yours sincerely,

Hon. Mark Mitchell
Minister for Emergency Management and Recovery

Private Bag 18041, Parliament Buildings, Wellington 6160, New Zealand | +64 4 817 6809 | m.mitchell@ministers.govt.nz

Sent by email to CDEM Groups 5 April 2024

Tēnā koutou katoa

I am writing to advise you that the Government has decided not to proceed with the existing Emergency Management Bill.

The Minister for Emergency Management and Recovery has written to the Chair of the Governance and Administration Committee to inform her that the Government does not intend to progress the Bill through its remaining legislative stages and suggest the Committee report the Bill back to the House early and without forming a view on the Bill.

The Minister is of the view that the existing Bill would not deliver the integrated, fit-for-purpose emergency management framework that New Zealand needs.

Submissions on the Bill and reviews into last year's severe weather events have highlighted significant system issues, including matters such as how information is collected and shared during responses and how the system partners with communities.

The Government is going to consider these reviews, including the Government Inquiry into the Response to the North Island Severe Weather Events, and work through exactly what improvements need to be made and how these will be delivered.

The Minister intends to introduce a new Bill this term, alongside making system improvements using existing mechanisms in the Civil Defence Emergency Management Act and non-legislative levers. For example, the current CDEM Act includes regulation making powers that could be used to prescribe requirements for emergency management professionals.

I recognise that you may have concerns about the pace on reforming the emergency management legislation but, as I am sure you will understand, it is critical that we get this right. A new Bill will provide greater opportunity for stakeholder input than making changes to the existing Bill through Parliamentary processes.

Even if there isn't legislative change happening right now, success in emergency management requires the emergency management sector and communities working together. NEMA is continuing to undertake work in this space, for example continuing to develop our programme of work focusing on Māori participation in the emergency management system - Te Kāhui Mataara. My expectation is that all parts of the sector, including CDEM Groups, should continue to work to make things better within existing legislative settings.

If you have any questions or concerns about what this means for your CDEM Group please feel to contact NEMA's Emergency Management Bill lead Sonia Wansbrough Sonia.wansbrough@nema.govt.nz.

Ngā mihi,

Dave Gawn | Chief Executive
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Empowering communities before, during and after emergencies.

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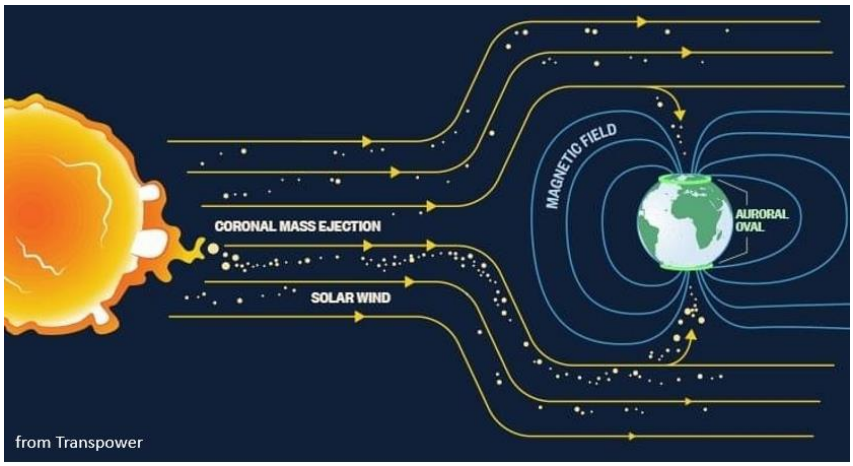
Te Rākau Whakamarumaru

Space weather information sheet

What is space weather?

'Space weather' refers to the occasional bursts of solar energy that occur when large eruptions happen on the Sun. This energy is released into the Solar System and is sometimes directed towards Earth. Solar events that cause space weather impacts include solar flares, particle radiation events, and coronal mass ejections.

- **Solar flares:** Solar flares are sudden bursts of X-ray energy from the Sun. X-rays can impact Earth within 8 minutes. Radio communications, Global Positioning Systems (GPS), and radar technology can be affected.
- **Particle radiation:** Solar energetic particle events are bursts of high-energy protons accelerated from the Sun's outer atmosphere. They can affect satellites and cause health concerns for air travellers. These events are associated with only minutes of warning.
- **Coronal mass ejections:** The most disruptive of space weather phenomena. Billions of tonnes of magnetised solar plasma erupt into space. If the material is Earth-directed, geomagnetic and ionospheric storms can occur. Both can significantly disrupt technology in the near-Earth environment. The event's size and scale will determine the level of impact and type of disruption. An extreme coronal mass ejection usually comes with at least 12 hours' notice. However, the exact characteristics will be unknown until it is observed at the L1 satellite 15-60 minutes before reaching Earth. This early warning can provide time to adjust the power system to reduce damage.



Solar activity follows an eleven-year cycle, with the next solar maximum expected in 2025. However, significant space weather events can occur at any time.

What are the potential impacts?

Extreme space weather is a low probability event, but it could have far reaching, potentially catastrophic consequences. Space weather can disrupt critical infrastructure like electricity, gas, rail, airways, and communication networks. It can also affect systems that these services rely on, such as GPS, Global Navigation Satellite Systems (GNSS), and radio communications. If critical infrastructure is damaged, the recovery period may be prolonged due to the significant international demand on replacement equipment with New Zealand potentially competing with larger markets. To reduce the magnitude and timeframe of disruption, mitigation actions should be taken during the short window of opportunity, between identifying the event and impacts on Earth.

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Find out more about the impacts from space weather from the Australian Bureau of Meteorology here.

What is NEMA doing?

NEMA's newly established Space Weather Programme addresses the gap in readiness and response arrangements through the development of a national response plan. This plan aims to coordinate the immediate actions of the All-of-Government response by identifying governance arrangements, an interim lead response agency, and support agency responsibilities. NEMA is collaborating with the Ministry of Business Innovation and Employment, Department of the Prime Minister and Cabinet, other government agencies, Transpower, stakeholders, partners, and scientists locally and internationally.

How does NEMA monitor space weather?

NEMA's 24/7 Monitoring, Alerting, and Reporting (MAR) Centre monitors space weather forecasts from the United States' National Oceanic and Atmospheric Administration and Australia's Bureau of Meteorology. In the event of a forecasted significant disruption, NEMA's MAR Centre will activate NEMA's procedures for managing space weather events, focusing on the coordination of stakeholders to minimise the impact on critical infrastructure.

What actions can CDEM Groups take?

In an extreme space weather event, disruption to electricity networks is likely. This will cause cascading impacts for people and communities, such as the potential inability to heat or cool whare/homes, get water, and use payment services, making it difficult to buy food and other goods.

CDEM Groups can:

- undertake risk assessments and consequence-based planning, such as for widespread power outages,
- continue Get Ready public education campaigns to emphasise the importance of preparedness,
- subscribe to receive space weather alerts for situational awareness from the above international space weather centres via their respective websites.

What should the public do?

- Space weather events can damage electricity networks, which could mean you and your whānau would be without mains power for some time.
- Power outages can happen anywhere at any time, so it's important to be prepared. Have a "prep talk" with your whānau and figure out how you'll cope when the power goes out. How will you prepare food, keep warm and see in the dark? And how will you keep up with the latest news?
- Get to know your neighbours because you may need to help each other out. If you are medically dependent on electricity-powered devices or equipment, make sure you have a backup plan.
- Get some emergency supplies together - including torches and a solar or battery powered radio, enough water for cooking and hygiene, and either a gas stove or food that does not need to be cooked.
- Find out more at NEMA's Get Ready site.

Contact us: space.weather@nema.govt.nz

Interim Response Plan v1.1

New Zealand Space Weather Response Plan

National Emergency Management Agency
Te Rākau Whakamarumaru

New Zealand Government

Interim Response Plan
New Zealand Space Weather Response Plan

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Te Rākau Whakamarumaru

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Approved by

This document has been approved by:

Name	Role	Version	Date	Signature
John Price	Director, Emergency Management	1.0	7 June 2024	
John Price	Director, Emergency Management	1.1	5 August 2024	

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Section 1 Introduction

Background

Space weather refers to events beyond the Earth's atmosphere that impact upon our technology and near- Earth space environment. The primary source of space weather is the sun, with the greatest disturbances usually caused by solar flare and coronal mass ejections, and subsequent radio and geomagnetic storm activity.

While extreme space weather is a low probability event, it has the potential for far reaching, and potentially catastrophic consequences. Extreme space weather may disrupt, damage, or cause the loss of critical infrastructure and may affect technology and the near-Earth space environment by:

- causing strong variations of the Earth's magnetic field,
- enhancing electrical fields and currents in the atmosphere and the ground,
- increasing the amount of radiation entering the upper atmosphere, and
- varying the density and stability of the upper atmosphere.

If critical infrastructure is damaged during a space weather event, the recovery period may be prolonged due to the significant international demand on replacement equipment with New Zealand potentially competing with larger markets.

The Interim New Zealand Space Weather Response Plan "this *Plan*" details key roles and responsibilities for a range of agencies in supporting the preparedness and response to a space weather event. It promotes effective emergency management, accountability, and transparency by designating Lead Agency emergency management functions, key decision makers, information and data flow arrangements and emergency management mechanisms and capabilities, in the event New Zealand's critical services are threatened or disrupted by significant space weather events.

Purpose

This *Plan* will operate as a temporary guide with minimum response requirements until a more fulsome response plan is developed, as recommended by the Director for Civil Defence Emergency Management, and in consultation with relevant stakeholders. The activation of this *Plan* does not change roles and responsibilities outlined in the National Civil Defence Emergency Management Plan Order 2015.

Note: At time of publication, wider sector and partner engagement is yet to be determined.

Scope

This *Plan* is for the national coordination of a space weather event, if the event is directed at the Earth, and there is a realistic expectation there will be disruptions to critical infrastructure or systems that critical infrastructure is dependent on (hereafter referred to as a 'significant space weather event'). This *Plan* aims to coordinate the immediate actions of the All-of-Government response by identifying interim governance arrangements, interim lead agency and agency responsibilities.

The response approach has been built off the *Australian Government Space Weather Event Plan* to enable rapid plan development.

Out of scope

- Longer term impacts from space weather, such as health impacts to aircrew or corrosion of fuel pipelines
- Regional Civil Defence Emergency Management (CDEM) response plans and arrangements maintained by CDEM Groups.
- Readiness and response to New Zealand's interests impacted overseas.
- Other New Zealand Government agency bilateral or multi-lateral response agreements already in place.
- Re-entry of space debris, resulting from a space weather event or otherwise.
- Other natural hazards and threats from and within the space environment.
- Malicious threats.

Planning assumptions

This *Plan* is applicable for the national coordination of significant space weather events that may cause:

- Partial loss of satellite infrastructure with disruption to satellite communications.
- Disruptions to systems such as Global Position Systems (GPS) navigation and radio communications.
- Significantly degraded and unreliable precision (position), navigation and timing (PNT) systems.
- Intermittent disruptions to very high frequency (VHF)/ultra-high frequency (UHF) telecommunications systems.
- Loss of high frequency (HF) communications systems.
- Possible power supply instability and transformer damage—while widespread loss of power is unlikely during most events, at the larger end of realistic events (a 100-year event) widespread loss of power is likely, prolonged outages to major metropolitan areas could occur, and transformer damage is possible.
- Second and third order consequences to a wide range of sectors including government, health, energy, water, aviation, communications, shipping, transportation, agriculture, and defence sectors.

Section 2 Roles and Responsibilities

Lead Minister

The Minister for Emergency Management and Recovery is the nominated Lead Minister responsible for space weather events, unless the Prime Minister chooses to appoint another Minister.

Upon receipt of notification of a significant space weather event, the Lead Minister is responsible for:

- Working closely with the Minister of Transport, Minister of Energy and the Minister for Media and Communications.
- Keeping Cabinet informed of developments.
- Deciding whether to declare a State of National Emergency.

Lead Agencies

NEMA is the interim Lead Agency for space weather response using the powers of the Civil Defence Emergency Management Act 2002, and arrangements in the National Civil Defence Emergency Management Plan Order 2015. NEMA is responsible for the All-of-Government coordination arrangements to facilitate preparedness, response, and recovery processes in the event of nationally significant impacts and consequences resulting from space weather events.

The coordination and response responsibilities for NEMA are encapsulated in the arrangements set out in the phases of this *Plan*. This includes:

- Receiving international alerts (from the United States Space Weather Prediction Centre and the Australian Space Weather Forecasting Centre) for imminent space weather events.
- Coordinating All-of-Government response to an emergency, including public messaging (see Appendix A).
- Providing rolling situational awareness via (depending on the scale of the event) NEMA's Monitoring Alerting and Reporting Centre, NEMA's National Coordination Centre, or the National Crisis Management Centre.
- Working with the Department of Prime Minister and Cabinet's (DPMC) Strategic Crisis Management Unit to establish whether the activation of the Officials Committee for Domestic and External Security Coordination (ODESC) system is required. If the ODESC system is activated, NEMA will report to ODESC and provide policy advice.
- Advising the Minister on the declaration of a State of National Emergency.
- If a State of National Emergency is declared, supporting the exercise of powers by the Director of Civil Defence Emergency Management and the National Controller.
- It is likely to be a requirement for emergency communication methods to enable coordination across all stakeholders and agencies if the usual technology-based methods are rendered inoperable.

Existing plans and arrangements will be used for consequence management, including widespread impacts to communities.

The recovery responsibilities are to determine what recovery assistance may be required and to lead coordination in recovery efforts through the National Recovery Coordination Group. The National Recovery Coordination Group will be established at the onset of this event.

Supporting Agencies

All New Zealand government agencies will need to implement their own business continuity arrangements and may have responsibilities as a supporting agency under this *Plan*. By default, the arrangements in the National Civil Defence Emergency Management Plan Order 2015 will be used to manage the second and third order consequences from a space weather event.

For the purposes of this *Plan*, key agencies involved in supporting the preparedness, response, and recovery processes in the event of national significant impacts and consequences resulting from space weather events are:

- **New Zealand Defence Force –** Responsible for supporting domestic operations under existing arrangements, including CONPLAN Awhina, if requested.
- **Department of the Prime Minister and Cabinet (DPMC) –** Responsible for activating and coordinating the ODESC system.
- **Ministry for Business Innovation and Employment (MBIE)** - Policy responsibility for the energy markets and telecommunications regulatory systems (note: key input for operational readiness plans for energy and telecommunications will be informed by relevant Sector Coordinating Entities).
    - **New Zealand Space Agency –** Responsible for coordinating All-of-Government policy advice and regulatory frameworks related to civil space sector activities. If requested, the Agency can assist with research and operational connections with overseas space agencies and other institutions with relevant capabilities.
- **GNS Science -** Responsible for providing data and information in the following areas: the Earth's geomagnetic field, geodetic measurements, and modelled crustal conductivity. GNS Science work closely with partners, notably University of Otago.
- **Ministry of Foreign Affairs and Trade (MFAT) –** Responsible for supporting the lead agency on international elements of emergency preparedness and response including international assistance. MFAT manage the New Zealand overseas missions and posts delivery of services to impacted New Zealanders overseas.
- **MetService –** The New Zealand Meteorological Service (MetService) is responsible (under ICAO ANNEX 3 of the Chicago Convention on International Air Navigation) for disseminating Space Weather Advisories issued by ICAO-approved Global Space Weather Advisory Centres (SWXCs) to all aircraft operators within the New Zealand domestic and international Flight Information Regions. Additionally,

MetService maintains relationships with other national meteorological services under the World Meteorological Organisation framework and can support access to relevant space weather capabilities of allied nations operating Space Weather Centres (including the Australian Bureau of Meteorology, the United States National Weather Service under their National Oceanic and Atmospheric Administration, and the United Kingdom Met Office.

Sector Coordinating Entities

Sector Coordinating Entities are entities that coordinate emergency response activities through a single point of contact as per Clause 2(1) of the National Civil Defence Emergency Management Plan Order 2015. For the purposes of this *Plan*, key Sector Coordinating Entities involved in supporting the preparedness, response, and recovery processes in the event of national significant impacts and consequences resulting from space weather events are:

- **Transpower –** Responsible for the electric power transmission in New Zealand. Transpower will run and manage the electricity sector technical response and advise NEMA of the electricity sector capabilities. Transpower also maintain Sector Coordinating Entity responsibilities for the electricity sector.
- **Ministry of Transport –** The government's system lead for transportation and chairs the Transport Resilience and Security Advisory Group.
- **Telecommunications Emergency Forum –** The Telecommunications Forum governs and operates the Telecommunications Emergency Forum who activate in an emergency as the Sector Coordinating Entity.
- **Reserve Bank of New Zealand** – The nation's central bank and are the steward of the cash system. Reserve Bank are the chair of the Cash Industry Sector Coordinating Entity.

Lead Senior Officials

The Lead Senior Official is the Director of Civil Defence Emergency Management, NEMA, who may delegate the functions and powers to the National Controller under section 10(1) of the Civil Defence Emergency Management Act 2002. The Director of Civil Defence Emergency Management, NEMA, is responsible for:

- Ensuring that relevant coordination arrangements are activated and relevant response activities under those arrangements are coordinated and deconflicted across the New Zealand government.
- Chairing the multi-agency Incident Management Team meeting to coordinate New Zealand government and CDEM Group efforts in the coordination of assistance.
- Advising the Lead Minister, relevant agencies including Supporting Agencies, and other relevant senior decision makers on coordination arrangements and actions being undertaken to facilitate and coordinate assistance to the incident.
- Communicating with other Senior Officials, to ensure streamlined coordination between relevant government agencies.
- Attending the appropriate level of the ODESC system meetings

and briefings on the situation and nature of the response arrangements established, the key strategic risks arising; any resource requirements and what the plan is to provide coordinated communications and messaging.
- Leading and amplifying key public communications activities for the incident.
- Activating this *Plan* in line with requirements set out in the phases described below.

The Lead Senior Official for Early Recovery is the National Recovery Manager, NEMA, who is responsible for

- Communicating with other Senior Officials, to ensure streamlined coordination between relevant stakeholders and agencies.
- Liaising with Group Recovery Managers, as appropriate.
- Identifying what recovery assistance is necessary.
- Advising the Lead Minister and other relevant senior decision makers on any recovery arrangements and actions being taken to facilitate and coordinate recovery assistance to the incident.

Officials Committee for External Security and Coordination (ODESC) system

The ODESC system is the strategic crisis response governance mechanism for emerging or actual crisis. The role of ODESC is to provide collective leadership and set strategic direction. The Chair of ODESC is the Chief Executive of DPMC. The Strategic Crisis Management Unit within DPMC are the stewards of the ODESC system and carry out the role of ODESC secretariat.

Following indication of a potential or actual significant space weather event, NEMA (as the lead agency), will notify the Strategic Crisis Management Unit duty officer. NEMA and the Strategic Crisis Management Unit will consult with the Chair of ODESC to determine whether the ODESC system should be activated.

If activated, all of government strategic coordination will occur through the ODESC system. A meeting commensurate to the situation and level of decision making required will be convened. This meeting will be used to:

- ensure a consistent understanding of the situation;
- ensure coordination of agency activities;
- identify key strategic risks and implications, and that these are being managed appropriately;
- ensure that the lead agency and support agencies have the resources they need;
- prioritise resources and response activities (if required);
- ensure appropriate communication arrangements (to Ministers, other stakeholders, and the public) are in place; and
- identify triggers for escalation.

Section 3 Response

There are three phases of this *Plan (this is consistent with the Australian Government Space Weather Event Plan)*[1]:

- STANDBY
- ALERT
- ACTIVE

This *Plan* may be activated when there is a nationally significant space weather event forecasted to impact upon New Zealand and/or its dependencies.

The Director of Civil Defence Emergency Management or National Controller, NEMA, is responsible for authorising phase changes to this *Plan*. NEMA is responsible for the All-of-Government notification of this *Plan* phase changes.

STANDBY

The Plan is maintained in STANDBY phase as the default condition. Under STANDBY the following activities are undertaken by NEMA:

- Monitor potential space weather events.
- Undertake contingency planning for potential responses.
- Undertake training and exercises to ensure this *Plan* remains fit for purpose.

ALERT

When notification of a Geomagnetic Storm 3 (G3), Solar Storm 4 (S4) or Radio blackout 4 (R4) or greater is received from the either the United States Space Weather Prediction Centre or the Australian Space Weather Forecasting Centre, NEMA's Monitoring Alerting and Reporting Centre will advise the Director of Civil Defence Emergency Management and the National Controller, NEMA, who may call a multi-agency Incident Management Team meeting to discuss the expected impacts and consider authorising a phase change of this *Plan* from STANDBY to ALERT.

When a phase change is agreed, NEMA's National Coordination Centre may be activated by NEMA. If a State of National Emergency is declared, the National Crisis Management Centre will be activated. Support agencies and other relevant stakeholders may be asked to provide a liaison officer, to be physically present within NEMA's National Coordination Centre / the National Crisis Management Centre.

NEMA will:

[1] *The Scales are adapted for Australian use from those produced by the United States National Oceanic and Atmospheric Administration. These scales are not formally agreed by the World Meteorological Organisation, however, are internationally accepted and used by many space weather monitoring agencies.*

- Advise appropriate stakeholders that this *Plan* has changed to ALERT phase via the Director of Civil Defence Emergency Management or National Controller, NEMA. Activate other relevant supporting plans and arrangements in anticipation of it being required.
- Hold a multi-agency Incident Management Team meeting to coordinate the anticipatory actions of New Zealand Government and private sector required in responding to the impact of a space weather event.
- Refine, in consultation with relevant stakeholders, targeted public messaging and directives in relation to the potential impacts of the predicted space weather event.
- Request relevant stakeholders provide liaison officers to be stationed within NEMA's National Coordinating Centre / the National Crisis Management Centre.
- The Public Information Management function will focus on likelihood and consequences to disruption to networks, including shutdown of parts of the electricity grid. NEMA's duty Public Information Management function will amplify Transpower's messaging through NEMA's channels.

The actions undertaken within the ALERT phase are in anticipation of the impact of a space weather event disruption or severing communication capabilities. ALERT phase will automatically revert to STANDBY phase after 72 hours unless otherwise advised.

ACTIVE

Where a significant space weather event is imminent and geographic location has been confirmed, an alert will be issued from NEMA's Monitoring Alerting and Reporting Centre. The National Coordination Centre will advise the Director of Civil Defence Emergency Management and the National Controller, NEMA, who may authorise a phase change of this *Plan* from ALERT to ACTIVE.

The Director of Civil Defence Emergency Management or National Controller, NEMA, may also authorise a phase change of this *Plan* from ALERT to ACTIVE where a significant space weather event has occurred without a prior alert being issued. This may occur due to the nature of an event or where a geographical location could not be adequately determined.

Under ACTIVE the following activities will be undertaken.

Pre-Impact Window:

Where a significant imminent space weather alert has been made by the Australian Space Weather Forecasting Centre identifying a pre-impact window.

NEMA will:

- Advise appropriate stakeholders that this *Plan* has been ACTIVATED.

- Undertake a Holistic Consequence Analysis and develop subsequent planning products to enable a uniform response.
- Hold further multi-agency Incident Management Team meetings to ensure all coordinated requirements are in place in anticipation for the potential disruption or severing of communications.
- Release approved public messaging in a coordinated manner within the earliest possible timeframe. NEMA will take a leading role and NEMA's Public Information Management function will scale up in a response. This will be impact-focused, including information and advice to the public about what people should and should not do. If widespread impact is forecast, NEMA's Public Information Management function can activate the Memorandum of Understanding with radio and television broadcasters. In the event of an electricity grid shutdown or major forecast impact, NEMA can issue Emergency Mobile Alerts.

Where a pre-impact window is unable to be identified, the Director of Civil Defence Emergency Management or National Controller, NEMA, may authorise these actions be undertaken in the ALERT phase of this *Plan*.

Post-Impact:

After the impact of a space weather event, NEMA will:

- Hold post-impact multi-agency Incident Management Team meetings upon re-instatement of communications to coordinate information flows relating to shared situational awareness of impacts, consequences and post-impact actions of New Zealand Government and private sector.
- Provide talking points and public messaging relating to the impacts of the space weather event on behalf of the New Zealand Government.

Post-impact consequences management and subsequent requests for physical assistance will be maintained under existing plans and arrangements.

Section 4 Coordination Arrangements

All-of-Government coordination

During ALERT and ACTIVE phases, All-of-Government coordination will be led by NEMA.

All-of-Government strategic coordination

During ALERT and ACTIVE phases, the ODESC system will be used for All-of-Government strategic coordination, if required. As stewards of the ODESC system, DPMC will initiate this coordination.

Multi-Agency Incident Management Team meeting

The multi-agency Incident Management Team meeting brings together relevant New Zealand, national, regional, and local government officials, the private sector, industry bodies, not-for-profit organisations and eminent individuals for coordination, communication and collaboration during response and recovery to domestic emergencies.

- The Director of Civil Defence Emergency Management or National Controller activates and chairs the multi-agency Incident Management Team. The National Recovery Manager (or delegate) may also chair a multi-agency Incident Management Team where the focus is on the recovery phase of the emergency.
- CDEM Groups and industry bodies may request that a multi-agency Incident Management Team is held for a specific purpose/issue.

All-of-Government situational awareness

All-of-Government situational awareness for space weather events will continue to be maintained by the NEMA's National Coordinating Centre or the National Crisis Management Centre during the activation of this *Plan*.

New Zealand Government Emergency Communication and Public Information

NEMA is responsible for coordinating New Zealand government emergency communication products, including All-of-Government talking points, in relation to the response undertaken in line with this *Plan* with the support of the other listed Support Agencies, as required.

Section 5 Post-Incident

Upon completion of all active tasks and confirmation of no further requirement of coordinated activity, the Director of Civil Defence Emergency Management or National Controller, NEMA, will approve this *Plan*, reverting to STANDBY.

Supporting New Zealand Government agencies will be notified of the phase change via the Director of Civil Defence Emergency Management or National Controller, NEMA.

NEMA will conduct an end-of-operation evaluation and lessons identified activity and participate, as required, in those after action activities conducted by other parties.

Appendix A – Space weather message pack

About space weather

- "Space weather" is caused by activity on the surface of the Sun. Sometimes, storm-like activity can throw out bursts of electromagnetic radiation and charged particles (plasma from the sun) which can impact Earth-based infrastructure systems, especially electricity generation.
- Extreme solar storms are rare. Two recent extreme events that impacted Earth's magnetic field are the Carrington Event in 1859 and the May 1921 event. Smaller storms over the past decades have damaged electrical transmission equipment – for example, a solar storm in November 2001 damaged a transformer in Dunedin, and multiple events have been observed to have impacted communications, positioning and more.

How NEMA monitors

- NEMA's 24-7 Monitoring, Alerting and Reporting Centre monitors space weather forecasts from the United States National Oceanic and Atmospheric Administration and Australia's Bureau of Meteorology.
- Transpower anticipates that New Zealand will get at least 12 hours' notice of an extreme solar storm (Coronial Mass Ejection – G type forecast) that is likely to impact power systems – it should be noted that arrival times of this storm have high uncertainty in terms of timing (+/- 7 hours) and characteristics (size and polarity) until observed by L1 satellites, approximately 15-60 minutes before they impact Earth. This advanced warning enables the industry to switch the power system to the most resilient state so that damage is minimised.
- For the Radio Blackout (R) and Solar Flare (S) type events, warning times may be much shorter (minutes for R, minutes to hours for S).
- If a storm is detected, NEMA's Monitoring Alerting and Reporting Centre will contact Transpower and other stakeholders, and activate NEMA's standard operating procedures for a space weather event. These focus on the impact to New Zealanders of a major infrastructure failure.

What NEMA is doing

- Space weather is linked to solar activity, which rises and falls across an 11-year cycle. The next "solar maximum" – a period of high activity – is estimated to occur in 2025. However, space weather events can happen at any time.
- NEMA's current planning revolves around the potential impact of a space weather event. In a severe event, this could involve widespread power outages, as well as impacts on radio and navigation systems.
- As with any major infrastructure failure, if space weather is forecast to cause significant disruption then NEMA would co-ordinate a response to help manage the impacts and consequences.

- NEMA is involved in regular discussions with Transpower, the Civil Aviation Authority and other government agencies, as well as local and international scientists.

What can the public do?

- NEMA's public education focus is centred around the impacts to New Zealanders. In a space weather event, the most likely impact will be power cuts which could last for some time.
- This is a timely reminder to prepare your whare and whānau for emergencies – power outages can happen anywhere at any time.
- Make sure you have emergency supplies including torches and a solar or battery powered radio, and food that does not need to be cooked. Find out more at our Get Ready site: No power — Get Ready — Emergency preparedness in New Zealand

National Emergency Management Agency
Te Rākau Whakamarumaru

National Emergency Management Update

Tairāwhiti CDEM Group Joint Committee meeting
3rd September 2024

Space Weather

The NEMA Infrastructure Resilience Team work on system readiness among lifeline utilities and also staff the Lifelines sub-function in response. In recognition of the coming solar maximum in 2025, NEMA has established Space Weather interim arrangements with Transpower regarding notification and escalation pathways. This will facilitate managing the risk to critical infrastructure.
Some expected effects of extreme space weather are:

- **Induced Currents** - Power system voltage irregularities possible, false alarms may be triggered on some protection devices. Some grid systems may experience complete collapse or blackouts. Transformers may experience damage.
- **Spacecraft** - Systems may experience surface charging; increased drag on low Earth-orbit satellites, uplink/downlink and orientation problems may occur.
- **Navigation** - Satellite navigation (GPS) problems may persist for days, including loss-of-lock and increased range error may occur. Low-frequency radio navigation can be out for hours.
- **Other systems** - Currents in steel pipelines can reach hundreds of amps, high frequency (HF) radio propagation may be impossible in many areas for one to two days.

Power outages and disruptions to HF communication have flow on effects for cellular communications, marine and aircraft communications.

NEMA Staffing Changes

- Wendy Wright, National Controller has been appointed to the role of Manager, National Operations as a secondment for 18 months. She will continue the role of National Controller.
- Magnus Latta has been appointed to the role Manager, Regional Partnerships commenced Monday 26 August. Replacing Kathrine Biggs who has been in an acting role for the last 12 months. Magnus joins NEMA from the Ministry of Business Innovation and Employment where he was the programme lead for the Mass Arrivals Response Plan Review.

Catastrophic Planning (CatPlan)

- NEMA recently hosted two All of Government (AoG) 'Catastrophic Planning Forum' with up to 54 participants across the system in attendance. This was an opportunity for agencies to workshop the operational phasing, planning assumptions from a Catastrophic event level. Since this forum, the CatPlan Handbook was updated alongside other workstream information and feedback. The next AOG Forum is planned for 19 August 2024.
- Thanks to this system-wide collaboration, we now have a Handbook with a clear purpose, easier to navigate, more detailed workstreams, and the whole document has a cleaner feel to it.
- The project team are now open for feedback on draft Version 0.3 of the handbook. The period for Feedback closes on 13 September 2024, so the project team are then ready for the final version that is due in mid-December 2024.

Review of Reviews

- NEMA Chief Executive commissioned the NEMA Continuous Improvement Unit to conduct a review of the 19 reports into the emergency management response to the 2023 North Island Severe Weather Events.

- The final report will provide an aggravated view of how frequently the same themes have been raised. The timeline for this report has been extended, however, a draft has been sent to CDEM Group Managers for consultation, with feedback required by 12 August.

CDEM Exercise Programme

- NEMA is looking to reinvigorate and establish the CDEM exercise programme. Groups are encouraged to share their exercise dates on the national exercise calendar.
- Early each year at the first EMLG, exercise dates will be reviewed and coordinated for that year to reduce conflict and overlap.
- Where possible exercises will be coordinated with the national exercise programme

Exercise Rū Whenua

- NEMA would like to thank all participants and especially the CDEM Groups for participating in Exercise Rū whenua, Wendy Wright as National Controller, has commented that during the Controller calls the CDEM Groups were well briefed and across the impacts and their roles in relation to each region.
- There are many lessons being extracted from the exercise, in particular the value that they add to our readiness and preparedness – building the relationships we will need in a response. While there were lots of lessons there is very strong call for more and regular exercises.
- A discussion is scheduled for the Emergency Management Leadership Group (EMLG) on 15 August in which the Group Managers will discuss Rū whenua and a future CDEM Exercise Programme.

CDEM Exercise Programme

NEMA Chief Executive commissioned the NEMA Continuous Improvement Unit to conduct a review of the 19 reports into the emergency management response to the 2023 North Island Severe Weather Events

Ian Wilson | Senior Regional Engagement Advisor,
National Emergency Management Agency Te Rākau Whakamarumaru

NIWA
Taihoro Nukurangi

Advice on and preparation of evacuation risk and survivability guidelines for New Zealand flood waters

Prepared for Gisborne District Council

May 2024

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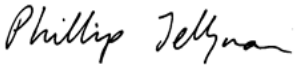	Approved for release by:	Phillip Jellyman

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Executive summary

The Gisborne/Tairāwhiti region experienced several flooding episodes in 2023, with the most severe flooding occurring in February during ex-Tropical Cyclone Gabrielle (herein referred to as Cyclone Gabrielle). One key issue that was identified after Cyclone Gabrielle was a limited understanding by Gisborne District Council (GDC) staff of the hazard posed by flowing waters if residents chose to self-evacuate, or if emergency managers issued an evacuation warning. Flood hazard is broadly defined as the combination of flow depth, velocity, and floating debris that pose potential harm to people or property or both. GDC interviews with flood victims after Cyclone Gabrielle indicated that there was substantial uncertainty about the best course of action for evacuation, especially regarding the hazard posed to individuals on foot or driving to flee floodwaters.

NIWA was engaged by GDC through a Ministry of Business, Innovation and Employment (MBIE) Extreme Weather Recovery Advice Fund (EWRAF) grant, to undertake a review of:

- Best practices for quantifying flood hazard posed to individuals and vehicles.
- Undertake a case study of Cyclone Gabrielle-induced flooding in the Te Karaka settlement area to demonstrate the application of the practices identified.

The study was intended to provide guidance to Civil Defence , emergency responders, and community members in the Gisborne/Tairāwhiti region.

This report summarizes the methods and results of the study which bridges gaps between current procedural advice outlined in the GDC flood warning manual, and the flood hazard posed to residents advised or ordered to evacuate during certain flood stage conditions. The NIWA study used a search of grey and primary flood hazard literature, an analysis of modern flood hazard estimation methods with new application to New Zealand residents, and a case study of flood hazard in the Te Karaka village during Cyclone Gabrielle flooding conditions. A flood inundation model generated through a separate MBIE Extreme Weather Recovery project was used here without modification as the flood hazard basis for the Te Karaka case study.

Our review of modern governmental standards for quantifying flood hazard indicate that they rely strongly on having a calibrated 2-dimensional hydrodynamic model simulation of a design flood to generate gridded representations of the flood depth and velocity over a spatial domain of interest and over several time steps representing different conditions of the flood hydrograph. These time steps are used to estimate peak flood hazard (maximum hazard). The flood depth-velocity (hazard) grid is the basis for estimating vulnerability of residents, vehicles, and structures to floodwaters.

The primary methods for converting hazard to vulnerability is using so-called ‘flood vulnerability’ curves. We found that current government flood guidance in the UK, USA, and Australia rely strongly on empirically based vulnerability curves for humans and vehicles, which are based on laboratory experimental studies. However, the scientific and engineering communities are moving toward the use of mechanics-based methods, which use principles of fluid mechanics to estimate force-balance on human bodies and vehicles. All these methods and curves require strong engineering judgement and value choices to be made by emergency managers, and thus have substantial ranges of values that can be applied.

For humans, we compared the empirically-based flood hazard methods with the mechanics-based methods using body types for a range of demographics of NZ residents. We found that the mechanics-based methods had strong overlap with the most widely used empirically-based methods

and did not find evidence that the mechanics-based methods were a substantial improvement given the additional uncertainties in the parameters required. We also compared mechanics-based methods for vehicles published in a recent study with widely used empricially-based vulnerability curves. We found that the mechanics-based methods had strong overlap the empirically-based vehicle stability regions and did not find evidence that the mechanics-based methods were a strong improvement given the additional uncertainties in parameters.

We used the RiskScape software engine to generate spatially explicit estimates of flood hazard posed to humans, vehicles, and buildings in the Te Karaka area under the conditions imposed by Cyclone Gabrielle. The flood hydrograph simulated by the regional hydrodynamic model was very similar to the hydrograph observed near Te Karaka. The peak flood hazard in Te Karaka occurred after overtopping of the stopbanks, and estimates indicated that the peak flood hazard was moderate to extreme for adults near town (high to extreme for children) and that 45 percent of roads in the area were unstable for passage by small passenger vehicles. However, model artefacts and geospatial data limitations produced unrealistic results for early portions of the hydrograph, and the spatial scale of the regional model may not have been adequately representing the stop bank elevations near Te Karaka. Nonetheless, the case study provided an example of a modern workflow for emergency flood hazard planning that can be applied anywhere in NZ and highlights key improvements that can be made when using these methods.

Based on our literature review and case study, NIWA has the following primary recommendations for improving estimates of flood hazard posed to residents in the Gisborne/Tairāwhiti region:

1. The current flood hazard guidance adopted by the Australian Disaster Resilience Institute for humans and vehicles have strong overlap with more recently developed mechanics-based methods and appear to be adequate for use in New Zealand flood planning. Mechanics-based methods, while providing more flexibility to choose for human and vehicle types, suggest a level of precision that may not be realistic for everyday use, and should be used with caution.

2. The use of depth and velocity grids from hydrodynamic models to estimate flood hazard requires strict scrutiny of the spatial resolution and modelling artefacts. Although the regional hydrodynamic model was adequate for a general demonstration of a flood hazard workflow for Te Karaka, scrutiny, and potentially additional post-processing of the regional hydrodynamic model results could improve estimates of flood hazard at Te Karaka and elsewhere in the region. If another, more localized hydrodynamic model is available, it could be used with the RiskScape software to cross-check the regional model results and potentially improve hazard estimates. Strict model scrutiny and cross-checking, particularly in populated areas, is advised anywhere these methods are applied in NZ.

3. Flood hazard estimates for bridges and buildings could be improved by attributing the data available from Land Information New Zealand with elevation and other building construction data. When implemented in the RiskScape workflow, elevation information can be used to generate more realistic estimates of hazard to bridges, which are particularly important to connect escape routes when flood waters are rising. Likewise, elevation information for structures such as floor levels and building foundation and wall materials could help improve estimates of where it may be safe to shelter in place under certain circumstances.

6 Advice on and preparation of evacuation risk and survivability guidelines for New Zealand flood waters

4. Although not considered in the case study presented here, estimates of the number and demographics of residents in buildings would be helpful for decision making regarding acceptable levels of hazard. For example, if a town has a large population of elderly adults, or disabled people, this would be a strong consideration when making the value judgement of acceptable levels of flood hazard during evacuation planning. Although these data would be extremely useful, it would need to be considered with great care and caution to protect personal privacy of residents.

5. The GDC flood manual used telemetered observations of stage heights at stream gauges for emergency flood planning and decision making. It is recommended that these stages are revisited on a regular basis and cross-checked with modelling and observations to assure that they are relevant to current conditions. This is particularly important in locations such as Te Karaka where the bed of the Waipaoa River near the local stream gauge at the Kanakanaia bridge has been aggrading for decades and may be shifting the stage-rating curve. As the GDC flood warning manual has had a recent review, revisiting stage-based actions and decisions outlined in that manual would provide additional confidence to emergency managers in the region. Such considerations would apply anywhere in NZ that stages are used for emergency flood decision making.

6. Overall, the methods employed and the findings discussed in this study have direct application to other catchments in Gisborne/Tairāwhiti and across other regions in NZ. The gaps and limitations highlighted in this study, as well as other contextual information at the local scale (e.g., catchment-specific characteristics, population dynamics/distributions), would need to be taken into consideration if applying similar modelling-based approaches to informing the development/updating of evacuation survivability guidelines/procedures.

1 Introduction

The Gisborne/Tairāwhiti region experienced several flooding episodes in 2023, with the most severe flooding occurring in February during ex-Tropical Cyclone Gabrielle (herein referred to as Cyclone Gabrielle). In Cyclone Gabrielle, fatalities and injuries occurred in both Hawkes Bay and Gisborne/Tairāwhiti as well as further injuries and near misses identified in post-event interviews with flood victims. One key issue that was identified after Cyclone Gabrielle was a limited understanding by Gisborne District Council (GDC) staff of the hazard posed by flowing waters if residents chose to self-evacuate, or if emergency managers issued an evacuation warning. While there is international literature into the issue of evacuation risk and pedestrian survivability in flood waters, a limited search of this literature by GDC did not identify any coherent analysis that would provide for the development of evacuation, or stay in place, guidance for New Zealand; especially when considering flood characteristics as exemplified by Cyclone Gabrielle.

Flood hazard is broadly defined as the combination of flow depth, velocity, and floating debris that pose potential harm to people or property or both (Wade et al. 2005). The GDC flood warning manual contains advice and consequences for key areas in Gisborne/Tairāwhiti region that recommend evacuation at certain flood height triggers monitored at stream gauges on the Waipaoa, Te Arai, Waimata/Taruheru, and Uawa/Hikuwai Rivers. For example, “evacuation of Te Karaka” is the advised consequence when the stage at the Kanakanaia stream gauge reaches 7.5 m (GDC 2023). However, beyond these gauged locations there is no indication if this advice is suitable for evacuees of various demographics, or whether stay in place (or other) guidance would be more appropriate under certain conditions. Current advisories do not, for example, consider the flood hazard posed to residents if they are ordered to evacuate, but the experience of Gabrielle is that people evacuating may encounter severe hazards during evacuation.

GDC interviews with flood victims after Cyclone Gabrielle indicated that there was substantial uncertainty about the best course of action for evacuation, especially regarding the hazard posed to individuals on foot or driving to flee floodwaters.

To provide guidance to Civil Defence (CDEM), emergency responders, and community members in the Gisborne/Tairāwhiti region, NIWA was engaged by GDC through a Ministry of Business, Innovation and Employment (MBIE) Extreme Weather Recovery Advice Fund (EWRAF) grant to:

1. Review of best practices for quantifying flood hazard posed to individuals and vehicles.
2. Undertake a case study of Cyclone Gabrielle-induced flooding in the Te Karaka settlement area to demonstrate the application of the practices identified.

Although the flood scenario used in the Te Karaka case study is specific to Cyclone Gabrielle, the application of the hazard quantification practices can be applied to other flood-prone regions in Aotearoa New Zealand.

1.1 Purpose and Scope

This report summarizes the methods and results of a study undertaken to generate guidance which bridges gaps between current procedural advice outlined in the GDC flood warning manual, and the flood hazard posed to residents advised or ordered to evacuate during certain flood stage conditions.

The results and guidance described in this report were built iteratively through engagement with members of GDC and Gisborne/Tairāwhiti community members through an initial inception meeting and final workshop.

2 Methods

This study used a search of grey and primary flood hazard literature, an analysis of modern flood hazard estimation methods with new application to New Zealand residents, and a case study of flood hazard in the Te Karaka village during Cyclone Gabrielle flooding conditions. A flood inundation model generated through a separate MBIE Extreme Weather Recovery project (Lane 2023), was used here without modification as the flood hazard basis for the Te Karaka case study.

2.1 Literature Review of Flood Risk Management

Increasing urbanization and global climate change are exacerbating the frequency and magnitude of flooding threatening communities worldwide. These increasing pressures have accelerated flood risk research and government approaches to flood risk management. We conducted literature searches of government flood risk management documents and scientific research papers to synthesize modern best practices in flood risk management. This effort focused on reviewing analytical methods and vulnerability information requirements for quantifying injury, survivability risk and/or threat to safety when individuals or vehicles are exposed to flood hazard.

2.2 Flood Hazard Analytical Methods Comparison

From our literature review, we identified key methods used in modern flood risk management for quantifying flood hazard to individuals and vehicles seeking to flee rising floodwaters. Many of these methods were developed using experimental studies on individuals in various European countries or Australia (e.g., Cox et al. 2010), and there is little information on their application to the demographics of New Zealand. New Zealand's most recent census indicates that its population was diverse, with 70% of people reporting European ethnicity, 17% Māori ethnicity, and 8% Pacific, 15% Asian and 3% other ethnicities (note that people were free to report multiple ethnicities; https://www.stats.govt.nz/tools/2018-census-place-summaries/new-zealand#ethnicity-culture-and-identity). In the Gisborne district, European ethnicity is 58%, Māori 53%, Pacific 5%, Asian 3% and 1% other ethnicities (https://www.stats.govt.nz/tools/2018-census-place-summaries/gisborne-region#ethnicity-culture-and-identity).

We tested the viability of industry standard empirical flood hazard classifications by applying recently developed mechanics-based (MB) approaches using body types for various demographics of New Zealanders. The MB approaches take inputs of a person's height and weight to calculate the hazard posed to that individual for different combinations of floodwater depths and velocities. We applied the MB method using average heights and weights for male and female adults and children across the four primary ethnic groups in New Zealand: (1) Māori, (2) Pacific Islander, (3) Asian, and (4) European/other. These statistics were extracted from the Ministry of Health's 2022/2023 Annual Data Explorer, which accesses the most recent demographic data from the New Zealand Health Survey (minhealthnz.shinyapps.io/nz-health-survey-2022-23-annual-data-explorer/).

2.3 Case Study – Te Karaka

Te Karaka is a settlement area in the heart of the Waipaoa valley in central Gisborne. Much of the settlement area of Te Karaka is along the banks of the Waipaoa River, with the town itself located on the inside of a large meander loop and protected by stopbanks. The town of Te Karaka lies downstream from the confluence of several major tributaries to the Waipaoa, and sedimentation from these headwater regions has been a persistent problem since at least the mid 1900's. The reach of the Waipaoa River in the Te Karaka area and upstream has been the subject of extensive scientific

study, which has indicated that the bed of the Waipaoa has been aggrading (raising in elevation) for decades, with the potential to exacerbate flooding (Gomez et al. 1998).

Some observations of the Cyclone Gabrielle flood hazard and impact characteristics in Te Karaka are:

- Te Karaka was hit particularly hard by floodwaters from Cyclone Gabrielle when the Waipaoa River breached its stopbanks and began flooding residential areas (Funding Approved For Flood Resilience Work In Te Karaka | Scoop News).
- Residents were awakened in the night by emergency services and ordered to evacuate immediately; many residents fled to the nearby hills to escape the rising floodwaters (Cyclone Gabrielle: Te Karaka residents given 20 seconds to escape when flooding hit | Newshub).
- Media reporting indicated that up to 500 residents evacuated up to the hills in their vehicles (Cyclone Gabrielle: Te Karaka locals rushed up hills to safety as usually benign river swamped their town | Stuff).
- As many as 100 homes are being demolished to prevent future flood damage (Funding Approved For Flood Resilience Work In Te Karaka | Scoop News).

The settlement area is also home to three maraes, one of which (Rangatira) was inundated by more than 2m of floodwaters (Figure 2-1).

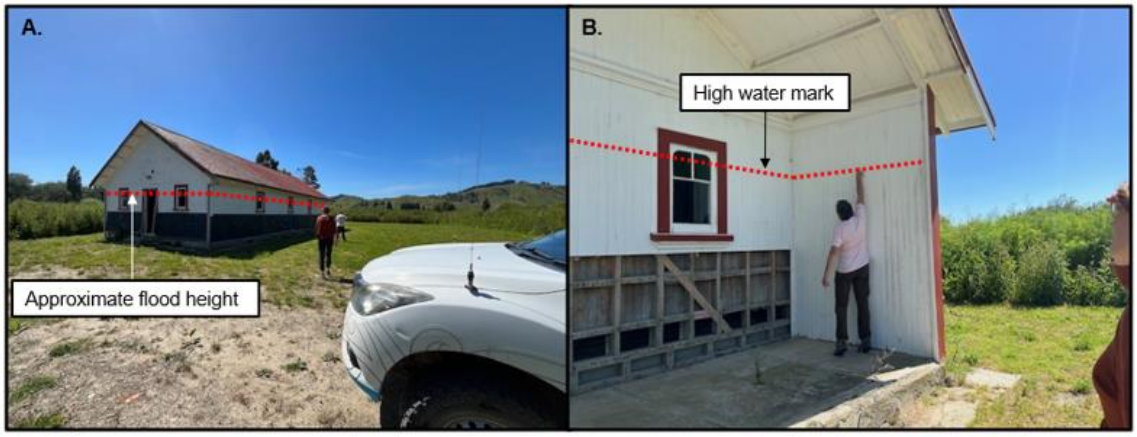

Figure 2-1: Images showing flood inundation levels at the Rangatira marae across the Waipaoa River from the town of Te Karaka. (A) Rangatira marae looking southeast; (B) southern end of Rangatira marae with Murry Cave, Principal Scientist of Gisborne District Council pointing to the high-water mark just overhead.

The extensive damage and emergency evacuation of Te Karaka make it an ideal location for testing and demonstration of state-of-the-art methods for estimating flood risk threat to safety and survivability. We used the multi-hazard risk analysis software RiskScape (Paulik et al. 2022), to generate maps of human safety threats at building locations and on 100 m road segments in the Te Karaka settlement area, as well as threat to vehicle stability on 100 m road segments.

2.3.1 Description of Gisborne area flood model of Cyclone Gabrielle scenario

The basis for flood hazard analysis in the Te Karaka area were time-series of spatially gridded depth and velocity estimates derived from a numerical flood model. The flood model was built as part of a

larger, separately funded effort outlined by Lane (2023) to estimate Gabrielle-driven flood magnitudes across the Hawkes Bay and Gisborne Regions. The model in the Gisborne region used a so-called 'rain-on-grid' approach that simulated rainfall and runoff at one-hour time steps across an 8 metre resolution digital elevation model (DEM) of topography. The model calibrated runoff to stages observed at various stream gauges throughout the region. The Te Karaka area has a stream gauge located at the Kanakanaia Bridge over the Waipaoa River, and the flood model accurately reproduced the observed flood hydrograph at that location (Figure 2-2).

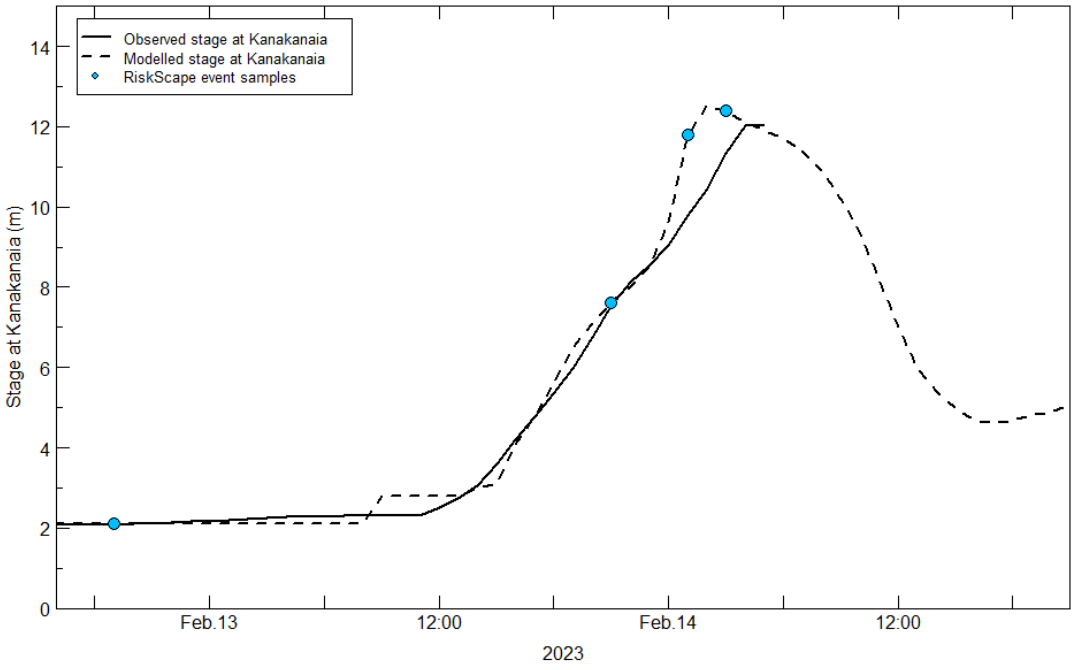

Figure 2-2: Timeseries of observed and modelled stage of the Waipaoa River at the Kanakanaia stream gauge in the settlement of Te Karaka during Cyclone Gabrielle. The blue dots represent the sampling points used to examine changes in flood hazard with rising stage in the RiskScape software.

The approach of Lane (2023) was to start the numerical model by allowing all rain-derived water to runoff the landscape to drainages. Although the model for the Gisborne District accurately reproduced stage hydrographs, the startup approach creates artifacts whereby small depressions in the DEM of the topography (either real or digital artefacts) require filling with water before runoff can occur. Consequently, portions of the landscape can appear to have pools of water when it is possible that none were present during the event (**Error! Reference source not found.**). These a rtefacts may result in unreliable estimates of flood hazard during the model startup stages of the flood event. The effects of these model artefacts are discussed in further detail in sections below.

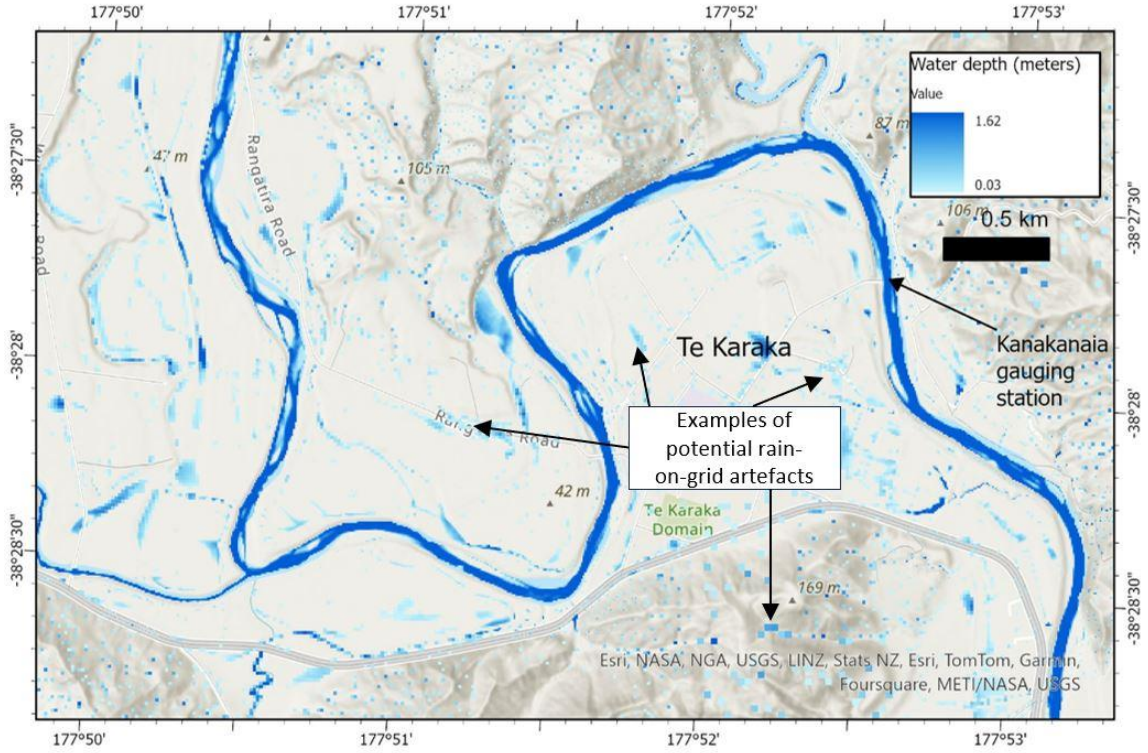

Figure 2-3: Map showing modelled flow depth of the Waipaoa River at Te Karaka and examples of potential rain-on-grid artefacts associated with model . The flow depths shown are for a stage of 2.8 m at the Kanakanaia gauging station, and the arrows point to four of many tens of ponding artefacts identified in the image. Flow direction is top to bottom.

2.3.2 RiskScape analysis of flood scenarios

RiskScape is an open-source software for multi-hazard risk analysis (Paulik et al. 2002). The RiskScape software implements modeller-defined risk rules over defined spatial domains, and applies them to other geospatial elements (roads, building footprints etc.) input to the model. Customised model workflows were developed to analyse human safety threat and vehicle stability in the Te Karaka study area (Figure 2-4).

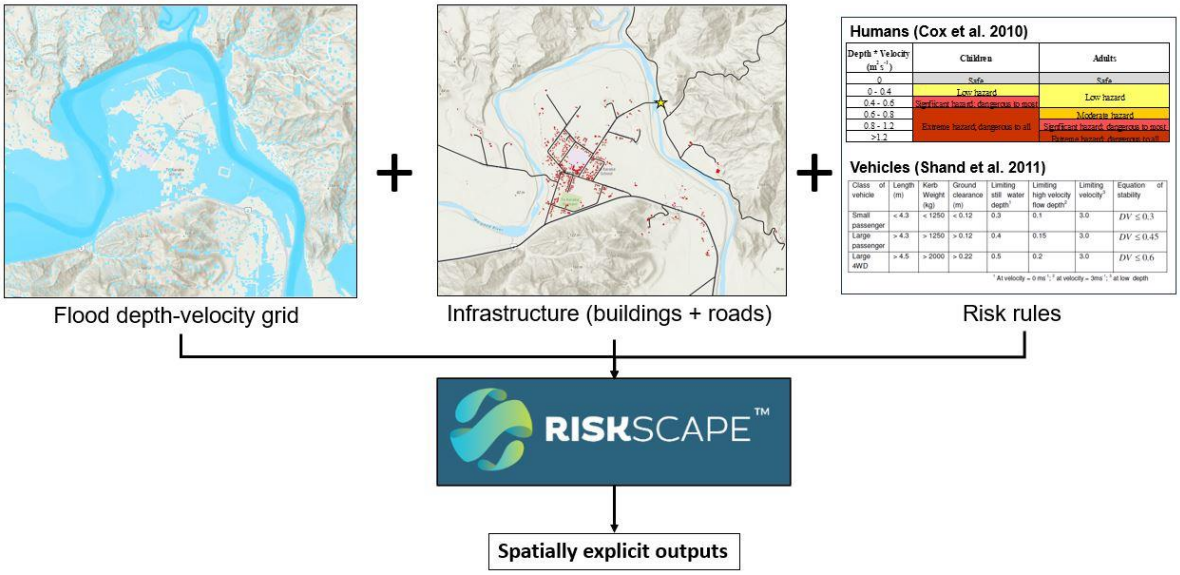

Figure 2-4: Schematic showing RiskScape workflow used to estimate flood hazard for the Te Karaka area.

Model input data to the Te Karaka RiskScape model included:

1. Hazard layers: gridded time series of inundation depth (D), flow velocity (V) and flux (DV, flow rate per m width) from the flood model of the Waipaoa river based on the Cyclone Gabrielle scenario (see Lane 2023 for details of the model). These data were available on an 8 m resolution grid across the Te Karaka landscape for each 1-hour time step (events) over the simulated Cyclone Gabrielle hydrograph (Figure 2-2).

2. Exposure layers: Locations of land, buildings and infrastructure exposed to flood risk. For this case study we focused on roads and buildings because these are associated with evacuation routes and sheltering in place, respectively.

3. Vulnerability models: these are functions that determine human safety threat and vehicle stability at locations exposed to the hazard event. In this case we used the Cox et al. (2010) function for human safety threat when near roads and buildings, and the Shand et al. (2011) safety criteria for vehicles.

Table 2-1 summarises input data for the Te Karaka model. A geoprocessing step was used in the Te Karaka RiskScape model to join information from the hazard input data layers to each exposure layer (buildings and roads). This step identified the hazard intensity present at the location of each building and each 100 m road segment. Details of this geoprocessing step are summarised in Table 2-2.

Table 2-1: Summary of Te Karaka RiskScape model input data.

Data Type	Input Data	Geometry Type	File Format
Hazard Layers	Depth, velocity and flux grids for Event 1, Event 2…Event X (each time-step).	Grid	Geotiff (.tif)
Exposure Layers	Roads (LINZ 2024)	Line	Shapefile (.shp)
	Buildings (LINZ 2024)	Polygon	Shapefile (.shp)
Vulnerability Models	Human (Cox et al. 2010) and vehicle (Shand et al. 2011) safety functions	-	Cpython (.py)

Table 2-2: Te Karaka model geoprocessing and sampling step-functions for input data geometry types.

Input Data Geometry		Geoprocessing Step-Function	Sampling Step-Function
Hazard	Exposure		
Grid	Polygon	Cut by intersection area	Maximum hazard intensity
Grid	Line	Cut by segment	Maximum damage value*

* Calculated during consequence analysis step.

A consequence analysis step was included in the RiskScape model to calculate human safety threat and vehicle stability for each building and road segment exposed to hazard at each analysis time-step. The Te Karaka RiskScape model output data reports human safety threat for flood-exposed buildings and roads, and vehicle stability for flood-exposed roads. For this study, outputs of exposure were generated for every 1-hr time step of flood evolution, enabling an indication of how the hazard exposure changes as the flood event progresses.

2.3.3 Post-processing of flood scenarios

The current GDC flood warning manual uses the stage (water level) of the Waipaoa River as observed at the Kanakanaia stream gauge as the basis for its Waipaoa flood warning procedures (GDC 2023). The Kanakanaia gauge is located adjacent to the town of Te Karaka, so it is a good indicator of flood severity affecting the settlement (**Error! Reference source not found.**). The hydrodynamic model b uilt by NIWA and used to simulate rainfall and runoff from the cyclone Gabrielle event replicated the shape and magnitude of stage change with reasonable accuracy (Figure 2-2), indicating that RiskScape model outputs could be used to accurately examine how flood hazard changes in the Te Karaka settlement area with changing stage at the Kanakanaia stream gauge. However, the flood model of the Gisborne Region was intended to simulate the large-scale flooding over time and space associated with Cyclone Gabrielle, and the 8 m resolution of the DEM used to model the floods of such a large area, was likely not adequate to precisely capture narrow features such as the tops of stopbanks protecting Te Karaka. Thus, some inaccuracy in the timing of stop bank overtopping or drainage would be expected in the model depth and velocity estimates used to estimate flood hazard.

We selected key time-steps (events), shown as blue dots on the simulated hydrograph in Figure 2-2, to sample and describe changes in the flood hazard during the Gabrielle flood scenario. These sample events were used to generate maps of human safety threat for infants, children, and adults escaping on foot near buildings and on roads based on the Cox et al. (2010) flood hazard functions. We also simulated vehicle stability threats from floodwaters on roads using the criteria of Shand et al. (2011) for small and large passenger vehicles, large 4WD vehicles, and fire engine-sized vehicles. Finally, we used the RiskScape outputs to generate example time-series visualizations of flood risk for the Te Karaka area as a way of merging spatial-temporal data into a single decision-making graphic.

3 Results

3.1 Literature Review

Our review of literature focused on the most current guidance documents published by emergency management agencies in Australia (Australian Disaster Resilience Guideline 7-3 2014), the United Kingdom (Ramsbottom et al. 2006), and the United States (Federal Emergency Management Agency 2020). We also examined recent scientific literature to determine if current government guidance was out of date relative to new developments. These documents typically focus on three primary steps in the determination of flood vulnerability: (1) development of a depth-velocity grid; (2) application of flood vulnerability curves; (3) integration of flood vulnerability maps into emergency evacuation planning.

The most basic definition of flood hazard is simply:

$$H_f = D * v \quad (1)$$

where H_f is the flood hazard (termed 'flood severity' in the United States) in units of length squared per unit time, D is local water depth in units of length, and v is local water velocity in units of length per time.

Our review of modern governmental standards for quantifying flood hazard indicate that they rely strongly on having a calibrated 2-dimensional hydrodynamic model simulation of a design flood; typically representing a flood magnitude with a certain return frequency or a representative event used for planning. The hydrodynamic model is used to generate gridded representations of the flood depth and velocity over a spatial domain of interest and over several time steps representing different conditions of the flood hydrograph. Herein, 'gridded' specifically refers to a raster representation of a quantity. In plain terms, rasters are images, whereby each image pixel (grid cell) has a value representing a discrete area. For example, a depth raster with 1-metre resolution, may represent the spatial distribution of depth for a given area, with each grid cell holding a value of the average flow depth for its 1 m^2 area (Figure 3-1).

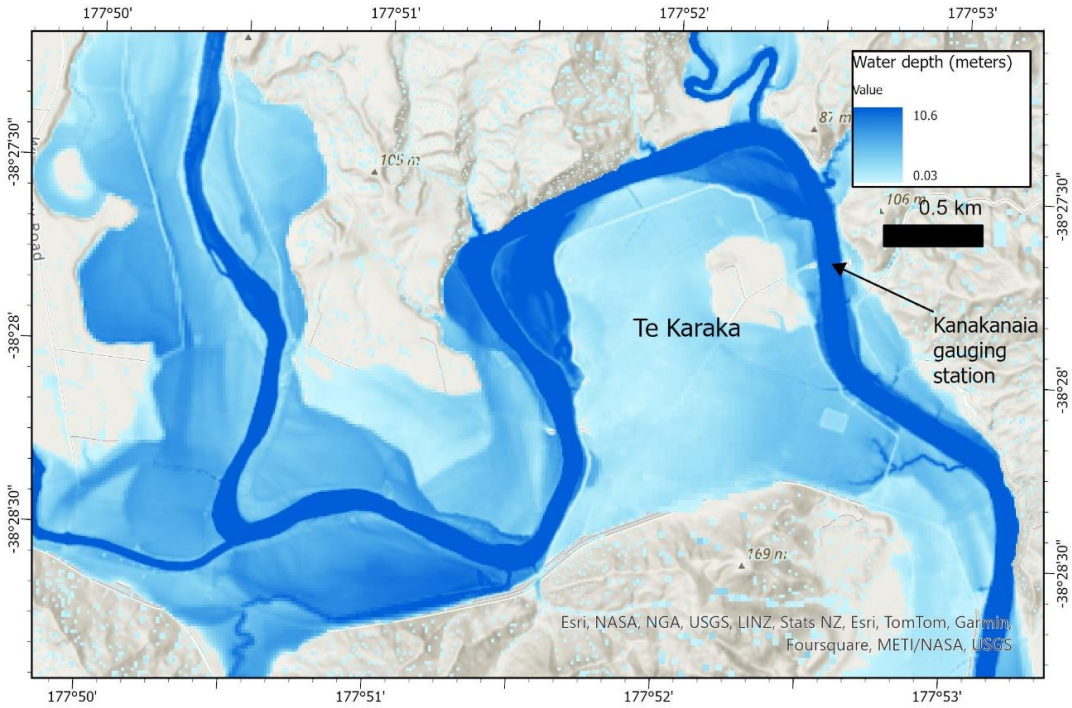

Figure 3-1: Map showing modelled flow depth of the Waipaoa River at Te Karaka. The flow depths shown are for a stage of 12.4 m at the Kanakanaia gauging station after stopbanks had been overtopped. Flow direction is top to bottom.

Peak flood hazard is defined as the maximum combination of depth and velocity over an area of interest, often the area of a single grid cell (Australian Disaster Resilience Guideline 7-3 2014). Because of the complex flow paths of flood waters over local topography and around objects and infrastructure in the landscape, peak flood hazard can occur before or after the actual peak stage of a flood event. It is thus recommended that flood hazard is calculated for each step of the flood hydrograph to identify when flood hazard is maximized (Australian Disaster Resilience Guideline 7-3 2014).

The flood hazard grid is the basis for estimating vulnerability of residents, vehicles, and structures to floodwaters. The primary methods for converting hazard to vulnerability is using so-called 'flood vulnerability' curves. Our review found that government guidance for calculating vulnerability posed to residents evacuating through floodwaters on foot or in vehicles relied mainly on empirically based lookup tables, which were derived and calibrated from a range of laboratory experimental studies conducted over the past four decades. Alternatively, recent scientific literature has been trending toward a focus on use of so-called mechanics-based methods (MB), which incorporate first principles of fluid-mechanics and allow for calibration and input of different body sizes. Below we provide summary of the basis and applicability of each method.

3.1.1 Empirically based flood vulnerability curves for humans

Empirically based flood vulnerability curves are generally drawn from experiments on human subjects. Various experimental studies including Foster and Cox (1973), Abt et al. (1989), Takahashi et al. (1992), RESCDAM (2000), Karvonen et al. (2001), Yee (2003), and Jonkman and Penning-Rowsell

(2008) have exposed human subjects of different body sizes, physical abilities, and footwear to various depths and velocities of water over various surfaces and recorded when these individuals lost stability through either sliding (remaining upright but losing ability to move) or toppling (losing footing and falling into the flow of water). The sample sizes in these experiments range from a single individual stuntman exposed to various conditions (Jonkman and Penning-Rowsell 2008), to as many as 20 adults (Abt et al. 2008).

The UK guidance relies on revised flood vulnerability curves developed by Ramsbottom et al. (2006) and calibrated using the data of Abt et al. (1989) and RESCDAM (2000). Ramsbottom proposed a hazard rating calculated through the following formula:

$$HR = d(v + 0.5) + DF \quad (2)$$

Where HR is the hazard rating in units of length square per time, and DF is the debris factor. The value of DF is assigned either a 0, 0.5, or 1 depending on the setting (pasture, woodland, or urban), and depth, with DF set to 0 for depths less than 0.25 m. Under these criteria, Ramsbottom et al. (2006) proposed categories of HR with values less than 0.75 being low hazard, between 0.75 and 1.25 being moderate hazard (dangerous for some, i.e., children), between 1.25 and 2.5 being high hazard (dangerous for most), and greater than 2.5 being extreme hazard (dangerous to all).

Guidance published by the Australian Disaster Resilience Institute (Australian Disaster Resilience Guideline 7-3 2014) suggests using a flood hazard rating based on a comprehensive study published by Cox et al. (2010). The Cox et al. (2010) study performed a re-analysis of published experimental data and proposed series of so-called hazard 'regimes' for children, adults, and trained rescue professionals (Table 3-1). Cox et al. (2010) also added absolute boundaries on depth and velocity for children and adults, which made the assumption that even deep stagnant water posed an unacceptable hazard when it reaches a depth requiring a person to swim for safety, or when depths are shallow but velocity is so high a person would be unable to stand.

Table 3-1: Flood hazard regimes for children and adults based on Cox et al. (2010) empirically-based criteria.

Depth * Velocity (m^2s^{-1})	Children	Adults
0	Safe	Safe
0 – 0.4	Low hazard	Low hazard
0.4 – 0.6	Significant hazard; dangerous to most	
0.6 – 0.8	Extreme hazard; dangerous to all	Moderate hazard
0.8 – 1.2		Significant hazard; dangerous to most
>1.2		Extreme hazard; dangerous to all

The US guidance (Federal Emergency Management Agency 2020) presents different curves that have magnitudes like those proposed by Cox et al. (2010), but no reference is provided for those figures in

that document. The text of the US guidance does, however, mention USBR ACER Technical Memorandum No. 11. (1988) which itself presents theoretical flood vulnerability curves, although the basis for those curves is also not clearly described in that report. Our interpretation is that the US Federal flood management agencies have not adopted a specific method for recommendation.

3.1.2 Mechanics-based flood vulnerability curves for humans

Recent scientific literature, including Xia et al. (2014a), Kvocka et al. (2016), Chen et al. (2018) and Musolino et al. (2020) have proposed the use of so-called mechanics-based methods in estimating flood hazard posed to humans exposed to floodwaters. These methods incorporate basic principles of fluid mechanics to estimate force-balance on a body submerged in water. These equations include coefficients that can be used to calibrate for shape, size, and mass of a human body.

The MB approaches began with Xia et al. (2014a), who presented two MB equations for sliding and toppling instability and tested them against the experimental data of Abt et al. (1989), and Karvonen et al. (2001). Although both methods are valid, the toppling stability equation appears to be the most widely adopted:

$$U_c = \alpha\left(\frac{h_f}{h_p}\right)^{\beta}\sqrt{\frac{m_p}{h_f^2\rho_f}(cos\theta + \gamma sin\theta) - \left(\frac{a_1}{h_p^2} + \frac{b_1}{h_f h_p}\right)(a_2 m_p + b_2)} \quad (3)$$

Where:

U_c = incipient (critical) velocity causing toppling (m/s)

h_f = water depth (m)

h_p = height of a person (m)

m_p = weight of a person (kg)

ρ_f = density of water (kg/m^3)

α = empirical coefficient

β = empirical coefficient

a_1, b_1, a_2, b_2 = coefficients that vary with characteristics of the human body

θ = angle of the sloping ground

γ = correction constant

When the tilting angle is assumed to be at or near 90° (person standing straight up), the angle term is excluded, and the equation reduces to:

$$U_c = \alpha\left(\frac{h_f}{h_p}\right)^{\beta}\sqrt{\frac{m_p}{h_f^2\rho_f} - \left(\frac{a_1}{h_p^2} + \frac{b_1}{h_f h_p}\right)(a_2 m_p + b_2)} \quad (4)$$

With the flood hazard risk being evaluated as the minimum of 1 or the ratio of local velocity to U_c:

$$FHR = MIN\left(1, \frac{U}{U_c}\right)$$

These equations have been applied in a variety of studies including Musolino et al. (2020) who compared the MB methods against the empirically based methods and asserted that the MB methods were more conservative and, thus, a potentially better representation of threats to safety. Despite this conclusion, we did not find government guidance documents from the UK, Australia, or US recommending adoption of MB approaches.

3.1.3 Vehicle stability curves

Flood vulnerability of vehicles follows the same general concepts as for humans whereby some combination of flow depth and velocity will either destabilize or immobilize a vehicle attempting to traverse floodwaters. Like humans, the methods used to estimate vehicle stability in floodwaters have included both experimental as well as theoretical approaches. Guidance from the UK relies on the methods of Keller and Mitsch (1993), while guidance in the US cites methods outlined in USBR ACER Technical Memorandum No. 11. (1988).

Shand et al. (2011) examined published experimental data from many sources and proposed interim criteria for vehicle stability using the product of depth and velocity whereby 0.3, 0.45, and 0.6 are the proposed limits for small passenger, large passenger, and large 4WD vehicles, respectively (Table 3-2). Although considered interim at the time of publication, the criteria of Shand et al. (2011) were adopted by the Australian Disaster Resilience Institute (Australian Disaster Resilience Guideline 7-3 2014).

Table 3-2: Vehicle stability criteria proposed by Shand et al. (2011).

Vehicle class	Length (m)	Kerb weight (kg)	Ground clearance (m)	Limiting still water depth (m)[1]	Limiting high velocity flow depth (m)[2]	Limiting velocity (m/s)[3]	Equation of stability
Small passenger	< 4.3	< 1250	< 0.12	0.3	0.1	3.0	DV ≤ 0.3
Large passenger	> 4.3	> 1250	> 0.12	0.4	0.15	3.0	DV ≤ 0.45
Large 4WD	> 4.5	> 2000	> 0.22	0.5	0.2	3.0	DV ≤ 0.6

[1] At velocity 1 m/s

[2] At velocity 3 m/s

[3] At low depth

As with flood vulnerability curves for humans, the science and engineering community have further explored vehicle stability in floodwaters using new experiments and MB methods. The experimental methods have included full-scale experiments on select vehicles (Smith et al. 2019), as well as experiments on smaller scale-model vehicles to calibrate MB parameters (Xia et al. 2014b). Recent reviews have indicated that the methods of Shand et al. (2011) underestimate stability for most vehicles relative to experimental data and that the limiting high velocities and depths may be unrealistically low (Martinez-Gomariz et al. 2018; Bocanegra et al. 2020). However, our comparison (Figure 3-2) of a recently published MBM vehicle stability calculation by Bocanegra and Frances (2021), which used an MB method published by Arrighi et al. (2015), indicates that, except for the

limiting velocities, that MB method produced more conservative thresholds than those published by Shand et al. (2011). There is thus some disagreement between methods recommended by governments, empirical data, and limits estimated with MBM approaches.

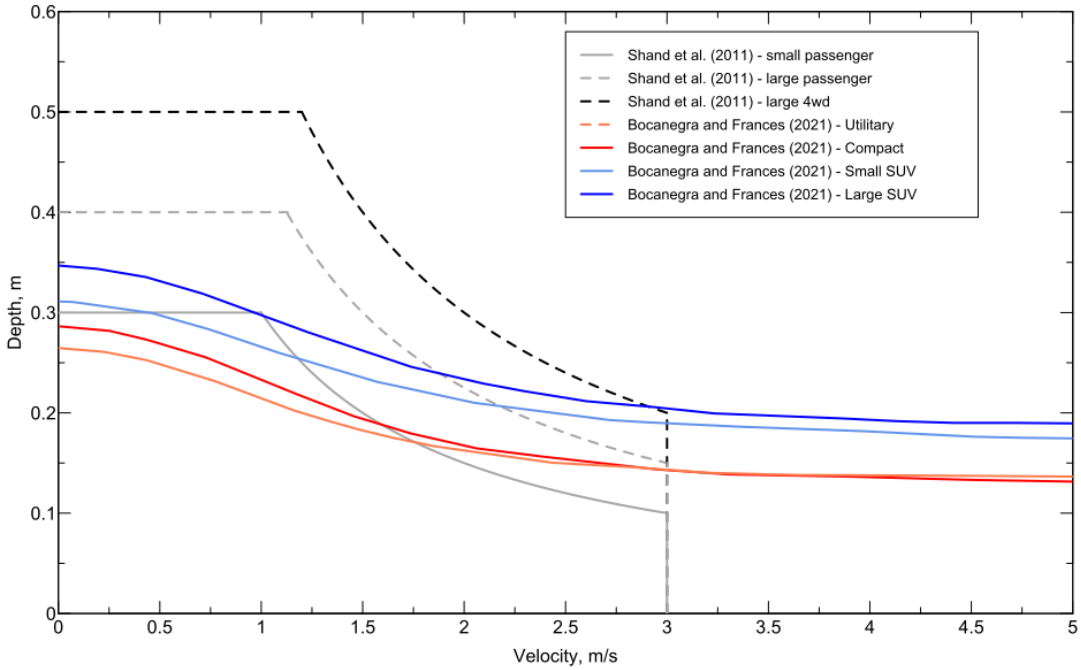

Figure 3-2: Stability curves for vehicles in floodwater. Lines represent thresholds above which vehicles of the types shown are estimated to be unstable.

3.2 Flood vulnerability methods comparison

We compared MB methods with the most current and comprehensive empirically based guidance of Cox et al. (2010). The MB method of Xia et al. (2014) was used to calculate U_c over a range of depths using a range of combinations of body heights and weights (4). For adults and children, female Asians and male Pacific ethnic groups represented the range of average body sizes for residents of Aotearoa (Table 3-3).

Table 3-3: Statistics of average height and weight of various ethnic groups of New Zealand (based on 2018 census data available from New Zealand Ministry of Health).

Ethnic Group	Female Adults		Male Adults		Female Children		Male Children	
	Height (cm)	Weight (kg)	Height (cm)	Weight (kg)	Height (cm)	Weight (kg)	Height (cm)	Weight (kg)
Māori	164	82	177	96	132	41	135	40
Pacific	**166**	**93**	**177**	**107**	**133**	**47**	**139**	**47**
Asian	**158**	**62**	**172**	**76**	**127**	**33**	**130**	**33**
European/Other	164	75	177	89	132	36	134	35

A variety of calibration values were available in the literature for toppling threat (Table 3-4), and there was no one set of values that we found were recommended. As a consequence, we extracted all of these values from the literature, and used median values for α and β, and majority values for a_1, b_1, a_2, b_2 (Table 2-1).

Table 3-4: Coefficients reported for mechanics-based flood hazard equations reported in literature. Values are shown for toppling threat only and are based on the equations outlined by Xia et al. (2014). Median values for alpha and beta, and majority values for a1, a2, b1, and b2 were used for the analysis comparing empirical functions and mechanics-based methods.

Source	Variable/coefficient					
	alpha	beta	a_1	a_2	b_1	b_2
Xia et al. (2014)[1]	3.47	0.19	0.737	0.001	0.263	-0.005
Xia et al. (2014)[2]	7.87	0.46	0.737	0.001	0.263	-0.005
Kvocka et al. (2016)[3]	8.86	0.47	0.633	0.001	0.367	-0.005
Kvocka et al. (2016)[2]	4.83	0.16	0.633	0.001	0.367	-0.005
Chen et al. (2018)[3]	3.67	0.27	0.735	0.001	0.265	-0.005
Chen et al. (2018)[2]	2.47	0.20	0.735	0.001	0.265	-0.005
Chen et al. (2018)[4]	3.06	0.30	0.735	0.001	0.265	-0.005
Musolino et al. (2020)	1.71	0.20	0.735	0.001	0.265	-0.005

[1] calibrated with plastic human-shaped figurines.
[2] calibrated for human subjects based on data in Karvonen et al. (2000).
[3] calibrated for human subjects based on data in Abt et al. (1989).
[4] 'unified', average values.

Comparison of the MB and empirically based methods showed that the methods had strong overlap, with the minimal criteria for both adults and children from the MB method plotting very near the minimum stability criteria in the Cox et al. (2010) stability fields (Figure 3-3). The MB method tended to show greater stability than Cox et al. (2010) regimes for children at the lower depth velocity combinations, and less stability in the higher velocity regions. For adults, the MB method tended to have near perfect overlap with Cox et al. (2010) for deep and moderately fast water but tended to show less stability in the higher velocity regions (Figure 3-3).

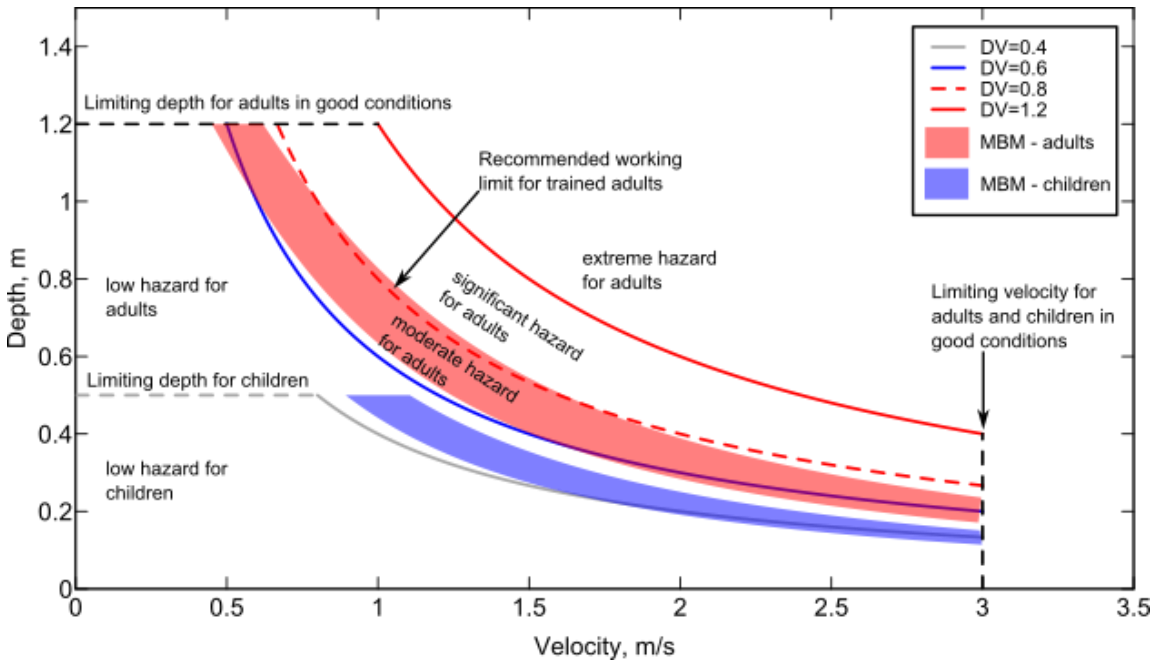

Figure 3-3: Overlay of critical velocity regions calculated using the mechanics-based method (MBM) of Xia et al. (2014) with the empirically based flood hazard regions of Cox et al. (2010). The MBM regions were calculated using ranges of average weight and height data for male and female adults and children from different ethnic groups in New Zealand.

Although we observed differences between the MB and Cox et al. (2010) methods, the uncertainties in the constants and calibration values of the MB method are high enough that we consider these differences to be within the uncertainties of the methods and suggest that the Cox et al. (2010) methods are adequate for estimating threat in the Te Karaka case study.

3.3 Case Study -Te Karaka

The model of Lane (2023), which was generated to simulate the floodwater conditions on the Waipaoa River imposed by Cyclone Gabrielle, was used to output hazard grids (flow depth and velocity) for the Te Karaka area. The Lane (2023) model covered a large region, and a local grid was extracted using the boundary obtained from the 'suburbs and localities' feature dataset available from the NZ LINZ Data Service (https://data.linz.govt.nz/layer/113764-nz-suburbs-and-localities/ accessed February 24, 2024). The hazard grid, roads network, and building representations from LINZ 2024) were ingested into the RiskScape software (Paulik et al. 2022), and the flood vulnerability rules of Cox et al. (2010) and Shand et al. (2011) for humans and vehicles, respectively were used to generate spatial representations of hazard levels at the location of all roads and buildings. Hazard levels were calculated for four selected times during the flood hydrograph (blue dots in Figure 3-5) and are available as interactive online maps (see Appendix A for details).

An example of the time representation of hazard posed to human evacuees escaping on foot via the road network is shown in Figure 3-4. Note that the flood hazard observed at bridges over the Waipaoa River in Figure 3-4B increases to 'significant' (depicted in red) while most of the roads are still in the 'low' safety threat category (depicted as yellow). This depiction is a consequence of the elevation of the road networks being tied to the elevation of the DEM. For much of the road network the elevation of the ground in the DEM is likely adequate, however, the elevation of the DEM at the bridge is the riverbed itself. This causes the bridge to falsely appear to be overtopping when nearby

roads are either not inundated or have a low threat to safety categorization. To fix this error across the entire road network would require obtaining and attributing the elevations of bridge features (girder, deck, kerb etc.). This exercise was out of the scope of the Te Karaka case study but is recommended if GDC would like to obtain the best estimates of flood hazard posed to bridges in the area.

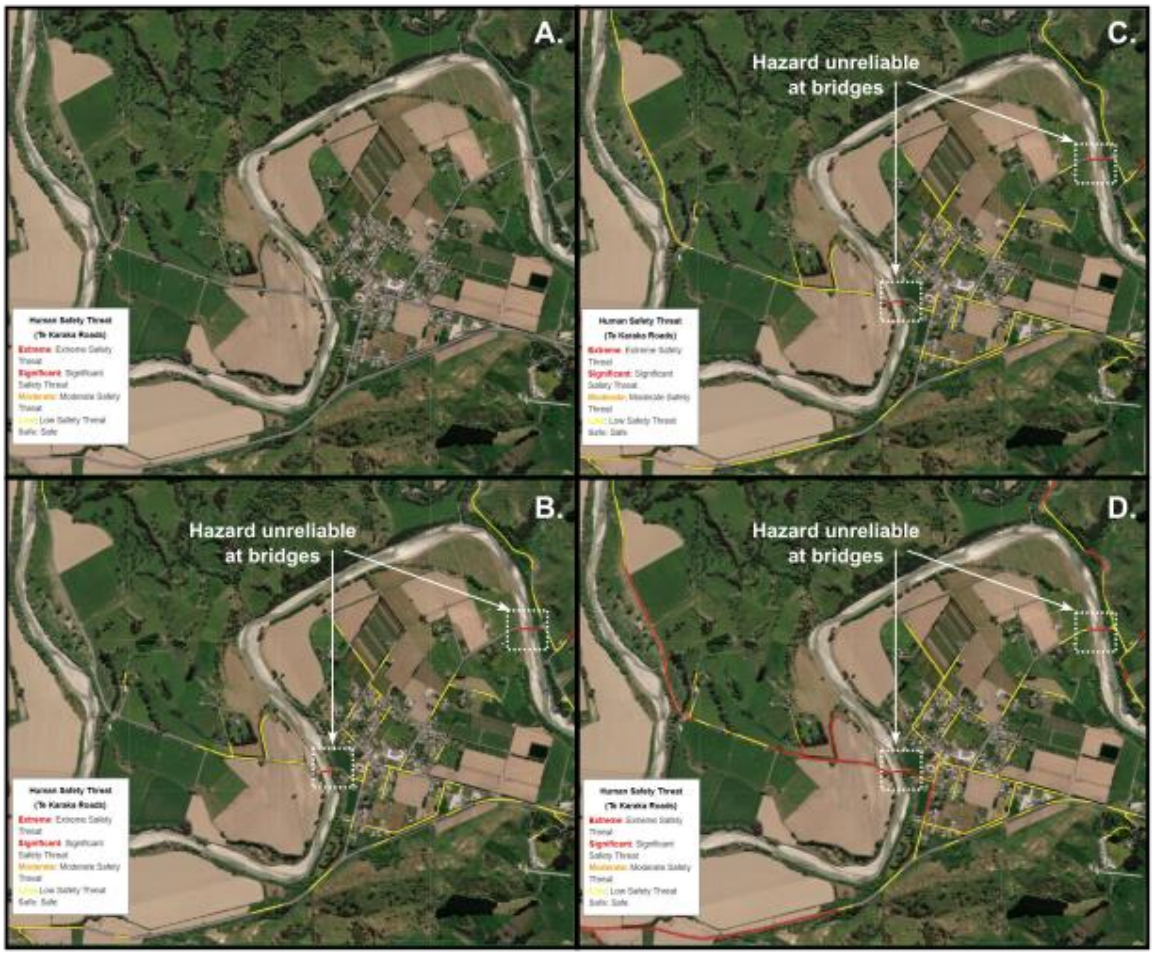

Figure 3-4: Maps showing RiskScape estimates of safety threat of flowing waters to adults attempting to escape on foot via road in the vicinity of Te Karaka. Maps A-D sequentially correspond to the six 'RiskScape event samples' shown on time series figures above and below for the modelled stages of the Waipaoa River at the Kanakanaia stream gauge.

We also generated time-series to summarize the flood hazard conditions for the Te Karaka area relative to each hourly output time-step saved in the model of Lane (2023). These time steps were tied to the stages of the Waipaoa River observed at the Kanakanaia stream gauge in the town of Te Karaka. Figure 3-5 shows the spatially averaged flood hazard category for adults in the town of Te Karaka, with the error bars depicting a single standard deviation value. Although the single standard deviation value is taken on integers (hazard categories), it reasonably depicts the range of hazards for each time step.

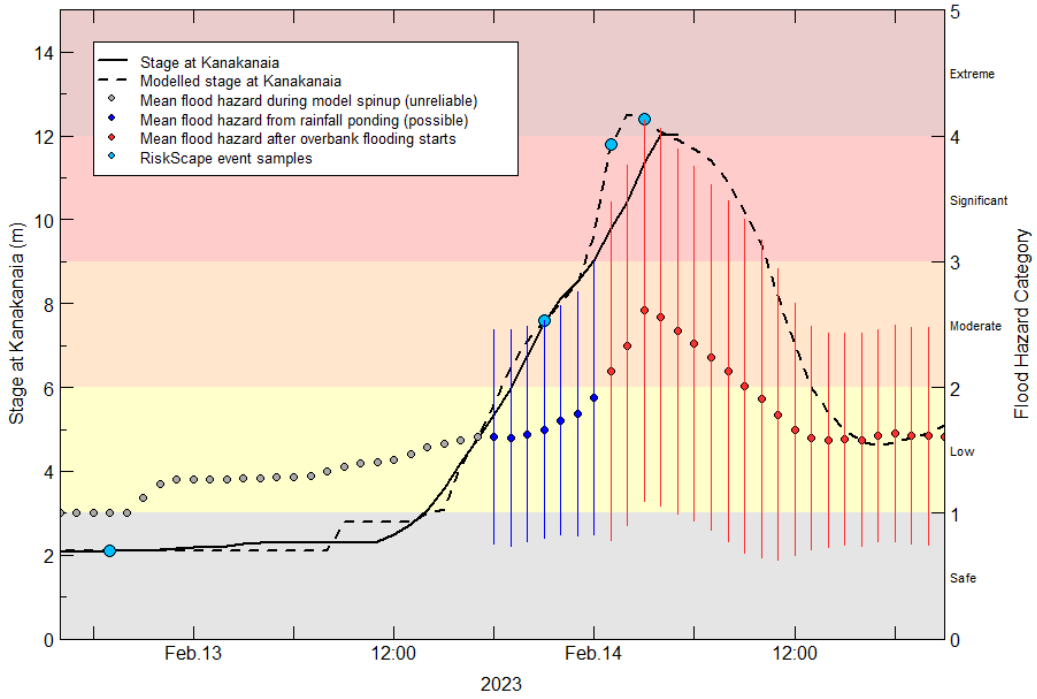

Figure 3-5: Time series showing road evacuation flood hazard (on foot) for adults relative to observed stage as the Cyclone Gabrielle flood on the Waipaoa River. The errors bars represent single standard deviations from the mean.

Note that the modelled mean flood hazard shown in Figure 3-5 increases to the 'low' category when the stage (modelled and observed) has not increased at all on late February 12 and early February 13 (Figure 3-5). This increase is an artefact of the ponding that occurs during model startup (**Error! R eference source not found.**), and the actual hazard is unknown but assumed to be lower. As depicted in Figure 3-5, we considered the hazard estimates for stages below about 5 m to be unreliable based on examination of flow depth maps. Above 5 m, note that the flood hazard decreases slightly, then begins to gradually increase. We interpret the slight decrease in hazard as the onset of true pluvial (rainfall-induced) runoff (as opposed to ponding) and suggest values after that mark are more reliable.

The recommended stage of the Waipaoa River at Kanakanaia for beginning evacuation of Te Karaka is 7.5 m (GDC, 2024). Our analysis shows that mean flood hazard for the Te Karaka area at a stage of 7.6 m (closet modelled stage) is still in the low hazard regime, but a single standard deviation is well into the moderate hazard category (Figure 3-5). Our analysis also shows that mean flood hazard to adults reaches moderate (extreme for children or vulnerable adults) when the stage at the Kanakanaia gauge jumps from 9.6 to 11.8 m, which occurred over a single hour in the simulated hydrograph. This jump occurred 3 hours after the stage of 7.6 m, indicating further evacuation on foot was unlikely to be possible on most roadways within four hours of the recommended evacuation stage.

We summarized the time evolution of hazard categories near buildings for the Te Karaka area over the flood hydrograph (Figure 3-6). These data can be interpreted as the hazard that would be experienced by residents attempting to escape from their homes or residences over the progression of the flood wave. As before, we interpret flood hazard estimates for stages less than about 5 m to

be unreliable. As shown on Figure 3-6, the onset of rapid increases in flood hazard occurs after a stage of 11.8m, just before levee overtopping. After levees overtop, but flood stage remains near its peak (last blue dot on Figure 3-6, stage of 12.4 m), the flood hazard in Te Karaka is maximized, with at least 60 percent of all structures in the low hazard category, and as many as 37 percent of buildings in the moderate hazard category (high hazard for children and vulnerable adults; Figure 3-6).

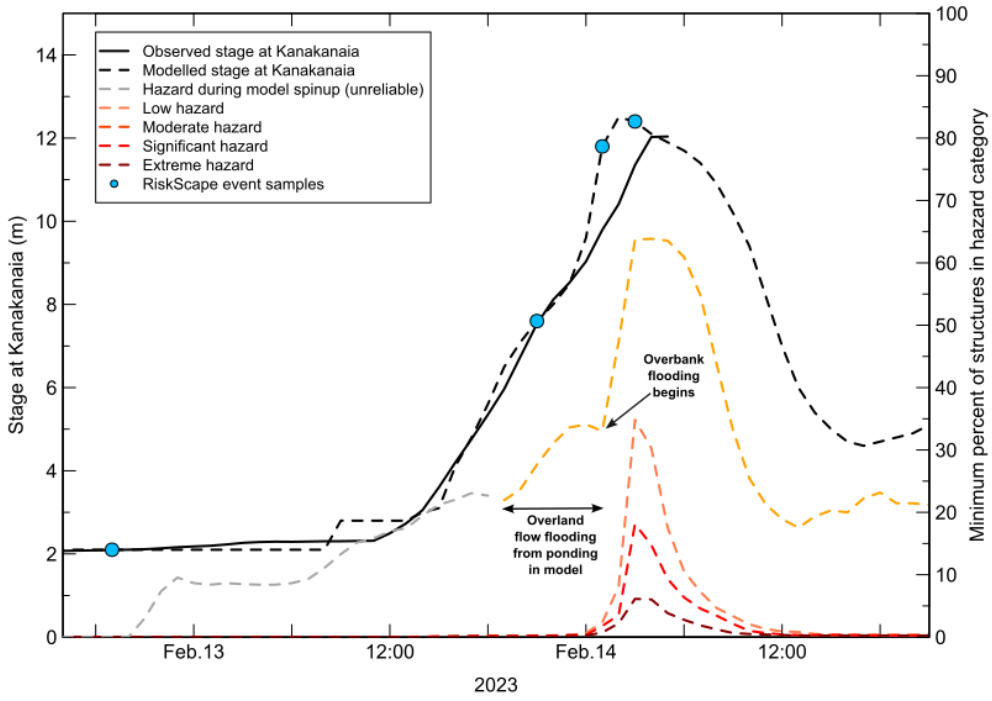

Figure 3-6: Time series showing flood hazard posed to adults at/near buildings with stage rise observed at the Kanakanaia gauge over the Cyclone Gabrielle induced flood on the Waipaoa River.

Finally, we summarized the time evolution of flood hazard posed to vehicles estimated by RiskScape (Figure 3-7). As before we considered flood hazard for stages less than 5 m to be unreliable. Vehicle stability on roads in the Te Karaka area begins to decrease rapidly for stages beyond about 8.0 m. At the maximum hazard of 12.4 m (0.1 m less than maximum stage), 45 percent of roads in the area register as unstable for small passenger vehicles, and 32 percent of roads are unstable for the largest vehicles (fire engines). The time between the stage of 8.0 m and 12.5 m (levee overtopping), was 4 hours, and the rate of rise in vehicle instability was steep over that period, indicating rapidly changing road conditions during the time when evacuations were likely occurring (Figure 3-7).

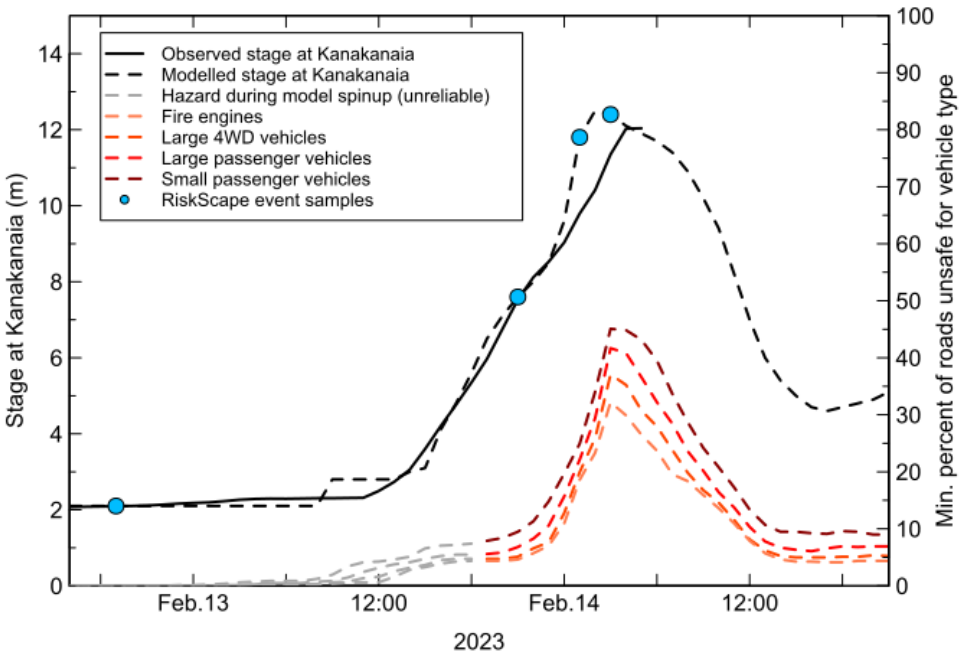

Figure 3-7: Time series showing percent of roads in the Te Karaka area estimated to be unstable (not passable) to different vehicle types. The estimates were created using the RiskScape software and the vehicle stability curves of Shand et al. (2011).

3.4 Limitations and other considerations

A key consideration in analysis of flood hazard for residents attempting to evacuate is that the acceptable level of hazard is a value choice. That is, emergency managers must consider the relative vulnerabilities of the communities they are planning to protect to decide on acceptable levels of flood hazard exposure. Our analysis showed that the criteria of Cox et al. (2010) were generally acceptable for the body types of peoples of Aotearoa, but using the demographic information also showed that there was a range of vulnerability depending on body size and mass. That range demonstrates that, for a given set of conditions, the most vulnerable people in a community, small children, may be unable to escape conditions that larger children and smaller adults could escape. Likewise, none of the methods we examined made attempts to estimate hazard for elderly or disabled community members, which means emergency managers must use careful judgement when using flood hazard exposure levels generated from this study.

The mechanics based (MB) methods we examined for people and vehicles, while allowing for more granularity in estimates of stability, should be used with caution. In the case of human stability, our purpose in comparing the MB methods with the empirical studies of Cox et al. (2010) was simply to understand if major differences were apparent when accounting for general New Zealand body types (Figure 3-3). These methods cannot account for a person's physical and mental capacity for navigating floodwaters. Two people of the same general body type may have very different levels of confidence for entering and moving through floodwaters, especially if physical disabilities are considered. Likewise, our comparison of MB and empirical methods for vehicles indicated strong overlap in estimates (Figure 3-2), and any attempt to account for specific vehicle types may give an operator a false sense of precision for localized conditions where road surface roughness, slope, debris and other factors may not be known with certainty. In short, the MB methods, while being

explored in the scientific and academic community, are helpful for cross-checking against empirically based methods but require a much larger burden of judgement regarding parameters and local conditions potentially making them less useful for everyday applications.

Our analysis for Te Karaka also did not consider the effects of floating or jamming debris transported in the Waipaoa River, a process that was widely documented in the region (Interpine Innovation, 2023). However, as is demonstrated by the Ramsbottom et al. (2006) hazard rating equation (2), even if a smaller quantity of debris is present (debris factor = 0.5), then the hazard increases substantially. For example, if the depth velocity combination results in the left side of equation (2) to be 0.5, a rating of 'low hazard', is pushed to 'dangerous for some'. Further, any value near the low hazard boundary of 0.75, will be pushed near the boundary of 'high hazard' (dangerous for most) if debris is present (DF ≥ 0.5). Thus, it can be assumed that if debris is present, conditions otherwise deemed to be in low to moderate hazard rating for adults are probably unacceptable for children and vulnerable adults.

Although estimation of depths and velocities required to transport large in-channel wood vary, a rule of thumb for the depth needed to mobilize (float) wood is approximated as half the trunk diameter (Kramer and Wohl 2017). In the Waipaoa Basin, the wood transported during the Cyclone Gabrielle flooding was generally observed to be from slash piles generated from agricultural forestry, which is widespread in the region. These slash piles are thus likely to be composed of 26 to 30-year old *Pinus radiata* (Monterey Pine), which are known to have mean diameters of about 0.5 m at harvest (New Zealand Farm Forestry Association 2024). Thus, floodwaters with depths of at least 0.25 m would potentially be deep enough to transport wood from these slash piles. This is in agreement with the Ramsbottom et al. (2006) criteria whereby a depth of 0.25 m is considered minimum for the debris factor to exceed 0.

Our analysis of flood hazard on the Waipaoa River during Cyclone Gabrielle was tied to stages at the Kanakanaia stream gauge because that stream gauge is used by regional emergency managers for decision-making when flood waters are rising or expected to rise in the Te Karaka area (GDC 2023). While our analysis showed general agreement with some of the action stages outlined in the GDC flood manual (i.e., flood hazard increased substantially after a stage of 7.5 m), the bed of the Waipaoa River in the Te Karaka area has been aggrading for decades (Gomez et al. 1998), and the accuracy of the consequences associated with each stage listed in the flood manual are unknown. A key consideration would be for emergency managers to use the gridded depth and velocity data from Lane (2023), as well as the HTML interactive maps from RiskScape generated for this study to cross-check and update the consequences associated with stages at the Kanakanaia gauge.

As stated before, our case study analysis contained some results that we considered to be unreliable due to limitations of the datasets used. The model of Lane (2023), while useful for quantifying inundation hazard at the regional scale, may not be the most appropriate model for estimating depths and velocities at the more local scale, like the Te Karaka area. A hydrodynamic model built specifically for the Waipaoa basin, with a spatial resolution that can more accurately capture the geometries of stopbanks in and around Te Karaka, as well as local drainage infrastructure, would likely provide a more realistic depiction of the time-evolution of depths and velocities in the area. When combined with robust estimates of elevation of bridges and other structural elements (i.e., floor levels of homes etc.), the RiskScape software could be used to provide a more detailed and accurate depiction of flood hazard over the Te Karaka area under the conditions of Cyclone Gabrielle than was presented here.

This study demonstrated the rise in flood hazard conditions for the conditions of Cyclone Gabrielle on the Waipaoa River at Te Karaka. The HTML maps generated from this study can be used to examine locations where roads become impassable for a given stage observed at the Kanakanaia gauge. Emergency managers must consider that these conditions are only valid within the region around Te Karaka, and that the flood hazard on roads outside of the Te Karaka area are likely to be different than those in our case study area. In short, emergency managers should be cautious in making decisions about road or escape conditions beyond Te Karaka given the data generated for this study.

4 Summary and recommendations

The primary flood hazard estimation methods recommended in government guidance documents for Australia, the United Kingdom (UK), and the United States (US) relied mainly on empirically based approaches derived from experimental data. Over the past decade, the scientific literature has been trending toward use of mechanics-based (MB) methods, which use a force-balance approach to quantifying crucial depths and velocities and have the advantage of being able to incorporate information for specific body types (demographics) and specific vehicle types.

While the guidance from Australia, UK, and the US has not been updated to incorporate MB methods, we compared the empirical and MB methods using information for body types of the peoples of Aotearoa and found strong agreement between the two methods. This analysis indicated that the empirical methods were adequate to represent vulnerability of residents in the Te Karaka area to floodwaters. Likewise, the MB methods for vehicle hazard had strong overlap with the empirical methods, which themselves are known to overestimate hazard relative to experimental data. The empirical methods have the potential to incorporate effects of floating debris, however, under the conditions where floating debris may be present, its' presence would increase hazard beyond the low or moderate levels that would be considered reasonable planning targets for evacuation. That is, if managers assume that floating debris will be present for a given evacuation condition, then the hazard posed to evacuees wading or driving through floodwaters should be considered high or extreme.

A case study of the Te Karaka suburb during the flood conditions caused by Cyclone Gabrielle in February 2023 indicated that the flood hazard on roads and near buildings increased rapidly over the rising limb of the hydrograph and maximized just after stopbank overtopping. Because of the spatial resolution of the flood model used, depth and velocity estimates for stages at the Kanakanaia stream gauge below about 5 m were considered unreliable, and the accuracy of stopbank representation was potentially poor. Likewise, road networks available from LINZ, did not contain bridge elevations, and estimates of flood hazard at bridges were also considered unreliable. Nevertheless, the case study provides a clear demonstration of the potential for combining geospatial data to generate spatially explicit estimates of flood hazard that can provide emergency managers with valuable information tools for planning evacuation and rescue operations.

Based on our literature review and case study, the following primary recommendations for improving estimates of flood hazard posed to residents in the Gisborne/Tairāwhiti region include, but are not necessarily limited to:

1. The current flood hazard guidance adopted by the Australian Disaster Resilience Institute for humans (Cox et al. 2010) and vehicles (Shand et al. 2011) have strong overlap with more recently developed mechanics-based methods and appear to be adequate for use in New Zealand flood planning. Mechanics-based methods, while providing more flexibility to choose for human and vehicle types, suggest a level of precision that may not be realistic for everyday use, and should be used with caution.

2. The use of depth and velocity grids from hydrodynamic models to estimate flood hazard requires strict scrutiny of the spatial resolution and modelling artefacts. Although the regional model of Lane (2023) was adequate for a general demonstration of a flood hazard workflow for Te Karaka, scrutiny and potentially additional post-processing of the Lane (2023) model results could improve estimates of flood hazard at Te Karaka and elsewhere in

the region. An improved hydrodynamic model which sufficiently resolves stopbanks, for example, could be used with the RiskScape software to cross-check the model results of Lane (2023) and potentially improve hazard and subsequent threat estimates at key locations of interest. Strict model scrutiny and cross-checking, particularly in populated areas, is advised anywhere that these methods are applied in NZ.

3. Flood hazard estimates for bridges and buildings could be improved substantially by attributing the data available from LINZ with elevation and other building construction data. When implemented in the RiskScape workflow, elevation information can be used to generate more realistic estimates of hazard to bridges, which are particularly important for escape when flood waters are rising. Likewise, elevation information for structures such as floor levels and building foundation and wall materials could help improve estimates of where it may be safe to shelter in place under certain circumstances.

4. Although not considered in the case study presented here, estimates of the demographic distribution of residents in buildings would be helpful for decision making regarding acceptable levels of hazard. For example, if a town has a large population of elderly adults, or disabled people, this would be a strong consideration when making the value judgement of acceptable levels of flood hazard during evacuation planning. Although this data would be extremely useful, it would need to be considered with great care and caution to protection of personal privacy.

5. The GDC flood manual used stages observed at stream gauges for emergency flood planning and decision making. It is recommended that these stages are revisited on a regular basis and cross-checked with modelling and observations to assure that they are relevant to current conditions. This is particularly important in locations such as Te Karaka where the bed of the Waipaoa River near the local stream gauge at the Kanakanaia bridge has been aggrading for decades and may be shifting the stage rating curve. As the GDC flood warning manual has had a recent review (Wilkinson 2024), revisiting stage-based actions and decisions outlined in that manual would provide additional confidence to emergency managers in the region. Such considerations would apply anywhere in NZ that stages are used for emergency flood decision making.

6. Overall, the methods employed and the findings discussed in this study have direct application to other catchments in Gisborne/Tairāwhiti and across other regions in NZ. The gaps and limitations highlighted in this study as well as other contextual information at the local scale (e.g., catchment-specific characteristics, population dynamics/distributions), would need to be taken into consideration if applying similar modelling-based approaches to informing the development/updating of evacuation survivability guidelines/procedures.

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7 Glossary of abbreviations and terms

GDC	Gisborne District Council
MBIE	Ministry of Business, Innovation and Employment
NIWA	National Institute of Water and Atmospheric Research
TEMO	Tairāwhiti Emergency Management Office
EWRAF	Weather Recovery Advice Fund

Appendix A Selected snapshots of threat to safety and vehicle stability

Interactive maps enabling the visualization of threat to safety and vehicle stability results are accessible via the 'html' links listed below (copy and paste into your web-browser if the links do not work when you click on them):

- Human Safety Threat - Te Karaka Buildings.html
- Human Safety Threat - Te Karaka Roads.html
- Vehicle Stability Threat - Te Karaka Roads.html

NIWA
Taihoro Nukurangi

Independent Review and Gap Analysis of the Gisborne District Council Flood Warning Manual

Prepared for Gisborne District Council

April 2024

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Executive summary

Gisborne District Council has a flood warning manual designed to guide Flood Warning Officers (FWOs) in assessing rainfall, river and other flood warning data and then advising the Tairāwhiti Emergency Management Organisation (TEMO) leading up to and during declared flooding events. The manual is an internal document that gets updated on an ad-hoc basis.

The extreme weather associated with Cyclone Gabrielle in February 2023 caused region-wide flooding that tested the manual's practical effectiveness. Following the event, GDC FWOs reviewed the manual and provided some updates. In addition to this effort and as part of its ongoing commitment to improving preparedness for flood response, GDC sought funding to support an external review of the flood warning manual.

GDC subsequently engaged NIWA to conduct this external review and gap analysis of the GDC flood warning manual via a Ministry of Business, Innovation and Employment (MBIE) Extreme Weather Recovery Advice Fund (WRAF) grant. The main tasks of this review were to:

- Compare the pre- and post- Cyclone Gabrielle versions of the flood warning manual.
- Interview key council staff about their perspectives of the effectiveness of the flood warning manual.
- Assess the core competencies and required training for Flood Warning Officers (FWOs).
- Recommend any improvements to the FWO role leading up to and during declared flooding events.

To accomplish the above tasks, we took the following approaches:

- Side-by-side comparative analysis of the pre- and post- Cyclone Gabrielle versions of the flood warning manual.
- Comparison of the GDC flood warning manual to flood warning documents from other New Zealand Regional Councils, as available.
- Comparison of the GDC flood warning manual to the Flood Warning Infrastructure Standard developed by the National Flood Warning Infrastructure Working Group of the Australia New Zealand Emergency Management Committee.
- Phone conversations with key GDC staff and a follow-up, in-person workshop with additional pertinent GDC staff.

The outcomes and recommendations included in this review are largely a reflection of the perspectives of participating GDC FWOs and other staff. Throughout this review process, it was clear that FWOs and other GDC staff involved in event response are dedicated to and engaged with improving their organisational flood response procedures.

The main outcomes and recommendations from this review are as follows:

- Provide greater imperative to the FWO role by stipulating in the manual the requirement for FWO duties to take priority during incident response.

- Provide guidance for resource upscaling when event magnitude (spatial and/or temporal) escalates.
- Clarify the roles and responsibilities of FWOs and other staff involved in incident management, including what people *are* and *are not* responsible for and how the roles interact.
- Make the manual a dynamic document: require post-event updates to the manual, make the manual more impact focused.
- Ensure that current and future FWOs have the necessary core competencies.
- Ensure that current and future FWOs have the appropriate support and opportunity to attend required training.
- Align the flood warning manual with national approaches to flood management: this item will likely need to be dynamic through time and will be informed by the outcomes of work to review Regional Council and Unitary Authority flood procedures across New Zealand as well as any updates to the CIMS framework into the future.

1 Introduction

On 14 February 2023, the New Zealand Government declared a National State of Emergency in response to the extreme weather conditions associated with Ex-Tropical Cyclone Gabrielle. The New Zealand MetService issued Red Warnings[1] for rain in Northland, Auckland, Coromandel, Gisborne and Hawke's Bay, and also issued Red Warnings for wind in Northland, Auckland, Coromandel and Taranaki (MetService 2023). Ex-Tropical Cyclone Gabrielle (herein referred to as Cyclone Gabrielle), represents the costliest weather-related event in New Zealand history, with the estimated cost of the event estimated to be about $14.5 billion NZD (Wilson et al. 2024).

Cyclone Gabrielle was just one of many heavy rain events in Tairāwhiti over the last 8-9 years (Cave 2024), and it resulted in extensive flooding, damage to critical infrastructure, and widespread evacuations. The magnitude of the event put GDC's flood response systems to the test. Reflecting on how the event response unfolded during Cyclone Gabrielle has thus presented the opportunity to consider improvements for future extreme weather events.

As part of the post-event review and through a Ministry of Business, Innovation and Employment (MBIE) Extreme Weather Recovery Advice Fund (WRAF) grant, Gisborne District Council (GDC) engaged NIWA to conduct an independent assessment of GDC's flood warning manual (herein referred to as the manual) and the internal review conducted by GDC following Cyclone Gabrielle. The manual is used to guide Flood Warning Officers (FWOs) in assessing rain gauge, river gauge and other flood warning data, and in communicating their recommendations to the Tairāwhiti Emergency Management Office (TEMO) during event response. Following Cyclone Gabrielle, GDC recognised that there may be opportunities for improving operational implementation of the flood warning manual.

1.1 Purpose, scope and research approach

Cyclone Gabrielle presented challenging circumstances for maintaining efficient delivery of information between key decision makers involved in response efforts in the Tairāwhiti region. GDC and TEMO wish to identify opportunities to improve efficiency and to ensure that shared information is timely, effective and accurate.

The purpose of this scope of work is to assess the GDC flood warning manual (both pre- and post-Cyclone Gabrielle versions) and work in partnership with GDC to understand the procedures that occurred as part of the post-Cyclone Gabrielle internal review.

The scope tasks, associated research approach and report section describing the outcomes of each task are outlined in Table 1-1.

[1] Red Warnings are issued by the New Zealand MetService for the most extreme of weather events, where substantial disruptions are expected. Red Warnings indicate that people need to take immediate action to protect their personal safety and/or their property, and that they should be prepared to receive and follow advice from official authorities and emergency service coordinators. [info from MetService, accessed via: Severe Weather Warnings and Watches » About MetService]

Table 1-1: Scope tasks and research approaches.

Scope Task	Approach	Report Section
1. Review the latest iteration of the manual and changes made following Cyclone Gabrielle and the internal review.	Side-by-side comparison of the pre- and post-Gabrielle versions of the manual to identify changes.	Section 2
2. Interview key GDC staff to obtain their perspectives of the purpose and effectiveness of the manual.	Initial phone conversations with key GDC staff, followed by an in-person workshop with additional attendees to further explore staff perspectives	Section 3
3. Review other flood warning manuals and for context the flood warning Infrastructure standard developed by the Australia Flood Warning Infrastructure Working Group established by the Australia New Zealand Emergency Management Committee.	Comparison analysis of the GDC flood warning manual with relevant sections of other flood warning manuals (where available). Comparison analysis of the GDC flood warning manual with the Australia Flood Warning Infrastructure Standard.	Section 4
4. Assess the core competencies required of Flood Warning Officers and recommend any improvements in their training, and their use of the data and information available.	Seek perspectives from experienced flood warning officers about required competencies and training for efficiently delivering flood warning services.	Section 5.1 and 5.2
5. Assess and present recommendations for the operational improvement of the Flood Warning Officers role leading up to and during a state of emergency or lower-level TEMO activation.	Seek perspectives from experienced flood warning officers about required competencies and support for efficiently delivering flood warning services. Synthesise findings from all previous scope items to identify recommendations for improvements.	Sections 5.3

2 Review of the GDC flood warning manual following Cyclone Gabrielle

The GDC flood warning manual is a document held internally within GDC. The manual gets updated on an ad-hoc basis, with its most recent update taking place in July 2023 following Cyclone Gabrielle. The revisions were undertaken by GDC Flood Warning Officers.

Here, we list observed changes made between the pre- and post- Cyclone Gabrielle versions of the flood warning manual (Table 2-1; Scope Task 1; GDC 2021 and GDC 2023 respectively). We then explore the effectiveness of those changes.

Table 2-1: Observed changes in the pre- and post-Gabrielle versions of the Flood Warning Manual.

Section of Manual (post- Cyclone Gabrielle version)	Change	Implications of change	Outcome
1.2 Staff Issued with Flood Warning Manual	"Area Controller" changed to "Group Controller"	Transition to new term to be consistent across CDEM roles. "Group Controller" is a statutory role with a well-understood meaning.	Streamline communications
	Add Principal Scientist to list of staff issued with the Flood Warning	Ensure all staff involved in event response have access to the manual to strengthen understanding of incident response procedures.	Streamline communications
2.2 Key Weather Sites	Removed NZ Weather and MetVuw as a 'key weather sites'	Reduce variability of weather predictions by utilising one, rather than multiple, weather prediction models. While removing key weather sites may give more clarity, there is a risk of missing a weather event if one of these now-removed providers forecasts an event that others do not. In the future, moving towards ensemble forecasting may enable integration of multiple forecasts.	Streamline communications
	Added MetService homepage as 'key weather site'	Indicate that MetService homepage is a key source of weather information.	Streamline communications
2.5 Flood Warning Officer's Key Procedures	Change "Heavy Rain forecast, be it a Warning or a Watch" to "Heavy Rain Warning" as the trigger for initiating contact between FWO and CDEM	Reduces ambiguity around whether the FWO needs to initiate actions at either the warning or watch level (there are different event severities attached to the two levels). Clarifies that the FWO needs to take action during "warnings". Does not distinguish between "Orange" or "Red" Weather Warnings. May require clarification around what actions to take leading up to these two different warning levels.	Clarify FWO action triggers

Section of Manual (post- Cyclone Gabrielle version)	Change	Implications of change	Outcome
	Removed "Civil Defence" from point 2 – FWO now to inform Duty CDEM Controller and GDC CEO	Streamlines warnings communications directly to response/recovery decision-making levels.	Streamline communications
	Gauge locations added to point 3, which lists the trigger levels of different rivers	Adds clarity around which gauge to use as the trigger level indicator for each of the four catchments included in the manual.	Clarify FWO action triggers
	Point 6 – now solely the FWO's job to provide CDEM with advice	Reduces number of people at different operations levels who give/receive communications.	Streamline communications
3.8 Waipaoa River Historic Flood Hydrographs at Kanakanaia	Update to Kanakanaia gauge hydrograph for Cyclone Bola (1988) to include Gabrielle (2023).	Places the Cyclone Gabrielle hydrograph in context with the Cyclone Bola hydrograph.	Historic context
5.9 Waimata/Taruheru River Historic Flood Hydrographs at Goodwins Road Bridge (Major Waimata events)	Update the Goodwins Road Bridge hydrograph to include water levels from high flow events in 2015 and 2023 (Gabrielle).	Places the Gabrielle hydrograph in context with other large flow events.	Historic context
6.4 Hikuwai Historic Flood Hydrographs at Willow Flat (Major Hikuwai events)	Update the Willow Flat hydrograph to include Cyclones Hale and Gabrielle.	Places the Gabrielle hydrograph in context with other large flow events.	Historic context
6.4.1 Hikuwai Historic Flood Hydrographs at Willow Flat (1996-2018)	Add historic hydrograph of high-flow events between 1996-2018 (e.g., excluding Bola and Gabrielle)	Shows other large flow events at the Willow Flat gauge.	Historic context

Section of Manual (post- Cyclone Gabrielle version)	Change	Implications of change	Outcome
6.4.2 Hikuwai Historic Flood Hydrographs at Willow Flat (Bola Vs recent events)	Present Willow Flat hydrograph record from Cyclone Bola in comparison to events since 2020	Places recent events (2020-2023) in the context of Cyclone Bola.	Historic context
Appendix 2 – Issue Flood Warning eTXT	Change to a new eTXT platform	Improved communications.	Streamline communications
Appendix 3 – Review eTXT message success (in pre-Gabrielle Manual)	Appendix 3 removed	Removal of instructions of how to check message success. TEMO/CDEM still reviews the delivery success post-message. May require clarification between FWOs and TEMO/CDEM around who "owns" eTXT platform.	Streamline communications

The above changes to the pre- and post-Gabrielle versions of the flood warning manual appear to contribute to one of three outcomes:

1. To streamline communication pathways;
2. To improve clarity of flood warning officer (FWO) action triggers, or;
3. To place the manual's procedural guidance in the context of historical high flow events.

All of the outcomes listed above seem to aim to improve efficiency of the manual in some way. However, there are some items in Table 2-1 that may need revisiting to ensure they provide improved efficiency. The items we encourage GDC to reassess are outlined in Table 2-2.

Table 2-2: Items changed in the post-Gabrielle version of the flood warning manual (GDC 2023) that may need revisiting.

Item to Review	Considerations
Removed NZ Weather and MetVuw as 'key weather sites'	While we recognise the utility of reducing variability in weather forecasts, there is a risk of missing an event if not all weather models are monitored. As discussed with GDC, we recommend considering an ensemble forecasting system that can incorporate numerous weather models and help communicate uncertainty.
Change "Heavy Rain forecast, be it a Warning or a Watch" to "Heavy Rain Warning" as the trigger for initiating contact between FWO and CDEM	While MetService Severe Weather "Watch" levels are lower-level alerts to encourage people to stay informed, we wonder if any preparation steps are lost with the FWO not needing to take any actions until a "Warning" is issued. If there are any preparatory steps during the Watch level, we recommend identifying those steps in the manual.

Item to Review	Considerations
Appendix 3 (Review eTXT message success) removed	We understand that TEMO/CDEM still check the success of eTXT delivery, so we wonder if Appendix 3 was removed to indicate that the FWO is not responsible for checking eTXT delivery. We recommend that GDC discuss and clarify in the manual who 'owns' the eTXT system; the manual indicates that FWOs are responsible for issuing eTXTs, but we understand from discussions with GDC that TEMO/CDEM are responsible for checking message delivery. If this system works, it will be fine to retain it, however it could be more clearly outlined in the manual.

In addition to the changes made by the FWO team following Cyclone Gabrielle, and this side-by-side gap analysis, there remains further opportunity to continue revising the manual as informed by those who use it during event response and incident management. We explore possible future improvements in Section 4.

3 On-the-ground perspectives: how do operational staff perceive the effectiveness of the flood warning manual?

Initial phone conversations and a follow-up, in-person, workshop were held with key GDC staff[2] to gather and discuss perspectives relating to the utility of the flood warning manual. Topics identified during initial phone calls were further explored during the workshop.

In general, GDC staff perceived the flood warning manual as a useful tool for flood response. However, they also noted numerous potential improvements. GDC staff generally agreed that the flood warning manual performs well in the following areas:

- Ease of use (e.g., the manual is straightforward to follow)
- Formalising the relationship between GDC staff (e.g., the FWOs) and Civil Defence Emergency Management (CDEM)
- Providing prescriptive operational guidance to reduce staff members' interpretation of what actions to take while being flexible enough to allow for innovation and quick-thinking when required.

GDC staff indicated that they would like to see the manual become a more dynamic document that gets regular updates and that provides the mandate for the FWO role to take precedence during incident management. For the remainder of this section, we discuss possible alterations to current content in the manual, or additions to the manual, that GDC staff identified. The details of some of that content (e.g., core competencies, training) are discussed in Sections 5.1 and 5.2, respectively.

3.1 Mandate for the precedence of flood response activities

GDC staff indicated that the current flood warning manual does not explicitly provide the mandate for flood response activities to take precedence over other work responsibilities during an event. Providing the directive for FWOs to focus solely on their flood response activities is critical to their functioning.

GDC staff indicated that during event response, flood response activities should take precedence over the FWO's business as usual (BAU) role. We recommend that GDC consider how they might be able to support the FWOs to act on this priority by articulating in the manual that their FWO duties take precedence over any other roles during event response.

As part of providing the mandate for event response, GDC staff feel like FWOs' managers could be more involved in understanding and supporting staff time in the FWO role (from an administrative standpoint). Managers should work with current and future FWOs to approve time for staff to dedicate to the FWO role and to identify and manage any potential operational conflicts. GDC staff indicated that some members of the current FWO team may face operational conflicts between their FWO roles and their business as usual (BAU roles). This concern is pertinent because there are some staff whose BAU roles provide critical support or information during event response. For example, if a staff member's BAU role involves collecting field data like river flow measurements or checking that instrumentation is functioning correctly during an event, they might not be able to fulfil that role if

[2] GDC staff included members of the Flood Warning Officer team (including the on-duty FWO during Cyclone Gabrielle), other staff in the science, environmental and planning teams, a representative from TEMO, and a representative from the GDC iwi engagement team. We henceforth refer to this group as GDC staff but recognise that the perspectives here may not represent all of those across GDC.

they are the on-duty FWO, because they need to be present in the Emergency Coordination Centre (ECC) to fulfil their FWO duties. Potential ways to manage such a situation may be to

- Deem certain BAU jobs/roles incompatible with the FWO role.
- Only allow a certain number of staff from a given team or department to be a FWO.
- Nominate other staff to take over critical BAU roles when the FWO is on active duty.
- Encourage staff from non-flood related council departments to become FWOs (e.g., encourage staff who would not have BAU and FWO role conflicts to become FWOs).

GDC staff would also like to see managers approving a proportion of full-time-equivalent (FTE) to be dedicated to FWO duties, including training (Section 5.2) and event response (Section 5.3).

GDC staff also indicated that the manual does not articulate the need for staff to partake in a post-event debrief. They indicated that the manual should stipulate that post-event debriefs are a critical component of event response, thus also the FWO role. GDC staff would like to see the manual state that event debriefs and "lessons learned" should be discussed and documented within 4-6 weeks of the event and that FWOs be required to be involved in that discussion (and supported with the necessary FTE allowance). It is likely that all FWOs – both any on-duty FWOs during the event and the rest of the FWO team – would benefit from being involved in post-event debriefs and corresponding updates to the manual following the event. As such, this activity should be supported by dedicated time committed to the FWO role.

3.2 Event escalation, resource requirements and formalised shift rotation

GDC staff feel like the flood warning manual could better outline a system for upscaling resources as the severity of an event increases. Currently, the manual does not describe a process for calling upon additional FWOs when an event becomes too large for a single FWO to manage, nor does it detail shift rotation and handover procedures when a new FWO comes on duty.

During the workshop, GDC staff indicated that once more than two catchments are flooding, it becomes difficult for the FWO to keep up with data updates and relay that information to CDEM. GDC may wish to consider what kind of resource upscaling will work best for the FWO team (noting that currently, they only have six FWOs and there are human wellbeing factors to consider) during events that have large spatial (e.g., multiple catchments in flood) and/or temporal (e.g., multiple days of extreme weather) extents.

It will be important for the manual to distinguish between shift rotation (e.g., for long-duration events) versus having a second FWO on duty for spatially widespread events. The manual should also stipulate that, if two FWOs are on duty to respond to an event, both of those FWOs need to be competent and capable of fulfilling the FWO role. Having a second on-duty FWO is not the same as having a less-experienced FWO 'shadow' a more experienced FWO; shadowing should be considered training (Section 5.2).

GDC staff indicated that a flow chart or action table detailing how and when to upscale resources for event response would be a useful component of the manual. This tool could outline how to determine different resourcing needs for different levels of response, as well as how roles and responsibilities evolve as events escalate.

During long-duration events that require shift rotation (shifts are defined as lasting twelve hours, starting and ending at eight o'clock), FWOs should participate in a formalised handover procedure. GDC staff suggested that during long-duration or complex events that require shift rotation, the incoming FWO needs to arrive an hour earlier than their scheduled shift to ensure they have sufficient time for a formalised handover. They need to hear the most recent briefing or receive an update from the outgoing FWO around what advice has been given to CDEM and what actions have been taken. GDC staff would like to see the manual provide both the mandate for a formalised shift handover (including the 13-hour shifts during an active incident to allow time for the handover) as well as a handover template for key information that needs to be passed on to the incoming FWO(s).

3.3 Role clarification

GDC staff feel that the manual needs to revisit role descriptions, clarify role responsibilities, and better outline how the various roles interact to more clearly identify what FWOs and other response staff *are* and *are not* required to do. Currently, Appendix 5 – "Job Descriptions" of the flood warning manual (GDC 2023, p. 57) provides descriptions for following job/role titles:

- Flood Information Officer (FIO)
- Flood Warning Officer (FWO)
- Team Leader Land, Rivers & Coastal
- Flood Control Operational Teams & Contractors (Fulton Hogan & GDC BioSecurity)
- Civil Defence Team.

We recommend identifying which of these titles correspond to jobs (e.g., those that are also BAU jobs) versus those which refer to roles (e.g., non-BAU roles like the FWO). Though perhaps a minor detail in semantics, it may help GDC to clarify who is responsible for what by identifying whether the items above align with a person's BAU job, or if they are a role associated specifically with event response.

There appear to be some similarities or duplications of descriptions across some of these roles, notable across the FIO and the FWO. As an example, the manual states that the FWO should "monitor & analyse the ARROWS.2 Flood Forecasting Model" (GDC 2023, p. 10). The manual also states that the Flood Information Officer (FIO) "interprets the output of the ARROWS.2 model and [conveys] relevant information to the Flood Warning Officer" (GDC 2023, p. 57). We also understand that from the workshop that GDC staff would like more clarity around who is responsible for data reporting, which is pertinent to numerous roles listed above.

We also recommend clarifying responsibilities around the eTXT platform. The manual states that the FWO is responsible for issuing eTXT warning messages to the public, yet it is our understanding that TEMO/CDEM monitor the success of eTXT delivery. Moreover, GDC FWOs indicated that the manual could outline a communication pathway between FWOs and TEMO/CDEM to inform the FWO about what actions TEMO/CDEM have taken. One GDC FWO indicated that, during an event for which they were on-duty, they issued advice to TEMO/CDEM and did not receive timely a notification from TEMO/CDEM about what decision(s) had been made. The FWO had to trust/assume actions had been taken. It would be a benefit to FWOs to clarify that there needs to be a communication loop between FWOs and TEMO/CDEM.

Clarifying roles and responsibilities will likely result in increased protection for staff, because the manual would provide more accountability for specific responsibilities and could also specify that the advice and decisions made by staff can only be as good as the information they receive. Revising the flow diagram in Appendix 6 (GDC 2023) could help to clarify and establish communication pathways. Illustrating the relationship across the roles will indicate what information needs to be passed between staff to what level of detail, accuracy and uncertainty[3]. Uncertainty is a key component of information transmission, and staff need to adequately equipped with the right communication tools to be able to convey uncertainty in their advice; the manual could outline how to manage different levels of uncertainty.

Aligned with role descriptions, GDC staff identified that a lot of key roles included the manual are listed by individual staff names. Listing people by name poses challenges when the manual is not updated regularly; for example, if a listed key contact has left their role or is unavailable for event response, then there is no guidance on who to contact in lieu of that person. We understand that it is important to know the individual who fulfils a certain role; as such, perhaps an updated list of staff names could be included as an Appendix to the manual, while reference to roles in the main manual document should be made to the role title. This task could be undertaken following role clarification.

Given there are some uncertainties or overlap between roles and responsibilities, we anticipate that reviewing and clarifying roles will provide benefit to the manual and to staff involved in flood response. The manual should also outline the key competencies or baseline proficiencies of FWOs and the other roles in the role description. Key competencies and baseline proficiencies are further discussed in Section 5.1.

3.4 A dynamic and comprehensive document

GDC staff indicated that they would like to see the manual be updated following every event. One way to make the manual more dynamic would be to include a table of key event details – such as peak river flows, rainfall intensity and duration measurements, etc. – and observed impacts associated with an individual event. Observed impacts might include names of streets that were flooded, areas that needed to be evacuated, etc. It might be appropriate for an event-impact register to be kept as an appendix or as an external document with a reference ID within the manual, to keep the manual from growing cumbersome.

If there is a period of time without extreme weather events, the manual should still be reviewed on a semi-regular basis so as to stay up to date. GDC staff will need to agree an appropriate timeframe, but we recommend a basic manual review should be undertaken at least annually. This basic review could be as simple as ensuring that roles, responsibilities and technology available to accompany those roles are updated, and that any staff listed out by name are also up to date.

To become a more comprehensive document, GDC staff would like to see more catchments included in the flood warning manual. Currently, there are only four catchments with action plans: the Waipaoa, Te Arai, Waimata/Taruheru, and Uawa/Hikuwai River catchments. GDC staff indicated that other large catchments, such as the Waiapu, are not included in the manual but often require some response efforts when in flood.

[3] GDC staff indicated that they would like the manual to discuss uncertainties in weather forecasting models, the flood forecasting model, responsibilities for looking after data, and communication pathways between staff who are responsible for checking asset data (e.g., stopbank strength, telemetry network performance) because that data impacts the advice that FWOs need to convey to CDEM.

4 Comparison analysis: how does the GDC manual compare to others?

4.1 Other New Zealand flood warning manuals

Regional and district councils across New Zealand vary greatly in terms of the size of community they serve and the amount of funding they have available to support their various initiatives. The different councils also manage river systems of different size and character. Due to such differences in resourcing (e.g., staff numbers), available funding, and the size and type of landscape that councils look after, there are considerable variations in the scope, style, and structure of flood warning manuals across all the councils. Information in this section is limited to the information we had available; it is not an exhaustive review of other New Zealand councils' flood warning manuals but provides a few examples of what other councils area doing in their flood response spaces that could help guide GDC in improving their manual. We also acknowledge that there is a great amount of work happening to revise flood response systems across the country. As such, this section is written to the best of our ability at the time of publication but may be subject to change in the future.

Some of the larger councils, such as Greater Wellington Regional Council (GWRC), have stand-alone documents outlining the flood response procedures for each of their major catchments. The Hutt Catchment Guide, for example, contains information pertinent to flood response in the Hutt Catchment such as a catchment summary, telemetry networks in the Hutt Catchment, duty officer action tables for flood events in the Hutt Catchment, rainfall frequency data and flood frequency data (GWRC, n.d.A). They have a separate document specifying the operational procedures of their flood response (GWRC, n.d.B). This document includes action cards and procedural flow-charts for various staff working in flood response roles.

Waikato Regional Council (WRC) structure their flood response by catchment zones[4], each of which have their own zone management plan. While a thorough review of each of the zone management plans was not conducted, the plans appear to provide an overview of river and catchment management for each of the zones[5], including some discussion around flood hazard and management strategies, but they do not appear to be designed as operational guidance documents for staff to follow during flood event response (e.g., WRC 2011). WRC has a "Regional flood response management plan" which guides coordination of council staff involved in flood response, defines governance roles, and establishes a framework for consistent response (WRC 2016). WRC also has stand-alone role descriptions for the Regional Flood Coordinator (Flood Manager) and their Regional Flood Liaison Officer (WRC 2023A&B). We also understand that they have a set meeting agenda for all key players in flood response and they publish major notifications via the WRC website page called Flood Room Live. WRC's Regional flood response management plan stipulates that an event debrief and review is critical to continued improvement of flood response, and provides the mandate for the Regional Flood Coordinator to coordinate "regional event report, debrief process, any flood manual updates and recommended operational improvements following the response" (WRC 2016, pg. 24). WRC also maintains numerous data portals for communicating environmental data.

[4] WRC provides river and catchment services within eight zones: Coromandel, Waihou-Piako, Lake Taupo, Waipa, Upper Waikato, Central Waikato, Lower Waikato and West Coast. The Coromandel, Waihou-Piako and West Coast zones align with major catchments. The Waikato River catchment contains the other five zones (WRC 2011).

[5] Zone management plans are available on the WRC website: https://www.waikatoregion.govt.nz/council/policy-and-plans/hazard-and-catchment-management/zone-management-plans/

The Hawke's Bay Regional Council flood manual provides some guidance on general flood response procedures. It has an action checklist but does not provide comprehensive procedural guidance on how to carry out those actions. The manual does provide high level information on the various stages of flood response but refers to other documentation – such as the Emergency Procedure Manual[6] – for role descriptions, staff functions, communications, and other items. The flood manual does provide the mandate for "all concerned personnel" (HBRC 2015, pg. 9) to provide post-event data and summary reports. We note that the version of the HBRC flood manual to which we had access is in draft form and is considered out-of-date, so may be subject to differences in more recently produced documents.

We are aware of ongoing work to review Regional Council and Unitary Authority flood procedures across New Zealand. This work was initiated by the National Flood Warning Steering Group and the River Managers Group, and is contracted to Tonkin & Taylor Ltd. As this work is ongoing and evolving, we cannot explicitly reference this work. However, we are aware that GDC is a willing participant in this review and that results from Version 2 of the assessment are expected to be ready in July 2024 (likely only available to the National Flood Warning Steering Group). We recommend that GDC utilise the findings of that work to further identify opportunities to improve their flood warning manual.

4.2 International (Australia-NZ) flood warning infrastructure standards

The Flood Warning Infrastructure Standard (FWIS) developed in 2019 by the National Flood Warning Infrastructure Working Group of the Australia New Zealand Emergency Management Committee (ANZEMC) provides a set of measures intended to guide the standardisation of flood warning services for sustainable and effective use (ANZEMC 2019). Flood warning services comprise networks of infrastructure, data collection and data communication used for flood forecasting and warning.

The FWIS is an infrastructure standard manual that mainly identifies performance requirements for flood forecasting and warning infrastructure and data communication. The GDC Flood Warning Manual is a procedural document that outlines the course of action that FWOs should take in response to flooding in the Tairāwhiti Gisborne region. As such, the information in the GDC Flood Warning Manual and the FWIS are largely different, but there are components of the FWIS that relate to components of the GDC Flood Warning Manual.

Here, we compare the relevant parts of the two documents to analyse whether any improvements could be made to the GDC Flood Warning Manual to better align with the FWIS (Scope task 3; Table 1-1). For this analysis, we identified the two most relevant parts of the FWIS as being:

1. Understanding river response;
2. Infrastructure performance requirements and verification methods.

4.2.1 Understanding river response

The FWIS describes river response as "water level rise from base flow to peak flow" (ANZEMC 2019; p.9). River response categories are either "flash" or "riverine" and are estimated using the metrics of time-to-peak (TTP); time of concentration (TOC) rain-to-river peak time; or catchment area upstream of the site (ANZEMC 2019). Functional and effective flood warning infrastructure relies on river response characteristics, because river response dictates how quickly data needs to be

[6] We did not have access to this document.

communicated and interpreted for effective management response. River response also dictates the sampling interval performance requirements for effective data communication.

Currently, the GDC Flood Warning Manual does not describe the river response categories for the four included river catchments. However, in sections that outline the flood warning procedures for the different rivers, there is mention of "lag" times, which give some information about the speed of river response in these locations. For example, when the river stage at the Kanakanaia gauge is 3.5 m and rising, the FWO must initiate communications with certain parties. The manual identifies a consequence of "Te Wairau bend 0.75-1.5M [right bank] (7.5 hr lag)". The "7.5 hr lag" component relates to the timing of river response/flooding, depending on tide, along Te Wairau bend right bank when the Kanakanaia stage reaches 3.5 m and rising (Figure 4-1). It may be useful for GDC to consider ways to classify river response categories using the data and information they currently have around lag times for river response.

Waipaoa River Flood Warning Procedures

River stage/level at Kanakanaia	Action by Flood Warning Officer	Consequence
Met Office Alert **Severe weather Warning or heavy rain Warning**	• Check ARROWS Model. • Notify FH Tiaki Wai Department Manager to start floodgate checks. • *CDEM will send out group email.*	
3.5m and rising	• Notify and Liaise with CDEM • Notify Pam Ross's Estate: Cath Carter on 027 78 11 000. • Notify License holder of Lot 3: Carl Hamlin 021826360 • Notify Glen Forrest: 06 863 3214 / 0212282535	Depending on tide: • flooding of river mouth berms • Te Wairau bend 0.75-1.5M RB (7.5 hr lag).

Figure 4-1: Example of lag times noted in the Waipaoa River Flood Warning Procedures table in the GDC flood warning manual. Taken from Section 3 Waipaoa River.

One of the items discussed by GDC staff as a potential improvement to the FWO's role includes a better understanding of the catchments included in the manual (and the wider region). As such, river response categories could be useful information to include in the GDC flood warning manual for each of the catchments as a way to not only provide more background information to the FWO, but also to provide guidance on how frequently data reporting needs to occur to make the best decision based on each catchment.

We acknowledge that the rivers in the Tairāwhiti Gisborne region are different to many rivers in Australia. Most of the rivers in Tairāwhiti Gisborne are likely to be classified as 'flash' because of their short, steep catchments. However, we recommend following a process to understand and better stipulate in the manual the different ways rivers in the region respond to extreme rainfall events (e.g., establishing critical rainfall to flood peak durations relative to different catchment saturation

conditions). For example, GDC could explore different levels of 'flash' response for their gauged, and potentially ungauged, catchments[7].

4.2.2 Infrastructure performance requirements and verification methods

Based on a river's response type (Section 4.2.1), there will be different data latency reporting (e.g., data transfer) requirements from the site to the user (e.g., the FWO). The FWIS suggests the following data reporting timeframes for different river response categories:

Table 4-1: Latency of reporting table from the Australian Flood Warning Infrastructure Standard. Page 10.

River Response	TOC (time of concentration; hours)	Latency (of reporting; minutes)
Flash	<1 hour	5
	<6 hour[s]	15
Riverine	<12 hours	15
	<24 hours	60
	>24 hours	1440 (24 hours)

Data users or operational teams need to ensure that flood warning infrastructure networks communicate data to the required performance standards, and the data needs to be in a form that is understood and usable by the user.

Infrastructure for collecting rainfall data should be capable of measuring rainfall equal to or greater than a specific maximum design intensity for its specific location. The FWIS stipulates that, unless otherwise stated, the maximum design intensity should represent the 1% annual exceedance probability (AEP) for the sampling interval (ANZEMC 2019, pg. 12). Similarly, river level monitoring infrastructure needs to be sensitive enough to capture initial stages of level rises, but have a large enough range to accommodate the highest expected flows (also 1% AEP). Both rainfall and river stage/level monitoring infrastructure need to meet certain accuracy, sampling interval and resolution standards (see the FWIS).

To our knowledge, the GDC Flood Warning Manual does not currently identify the required intervals of data transfer for each of the included catchments. This information may be known to other parts of GDC, but GDC might wish to consider including this information in the flood warning manual to provide another point of reference, including the appropriate data update intervals from their telemetry networks for each catchment. We understand that the Kanakanaia gauge on the Waipaoa River logs data every 5 minutes, and communicates that data every 10 minutes. It may be useful to document similar data recording and transmission intervals for the other catchments included in the manual.

[7] Determining accurate levels of 'flash' response across the different catchments will likely depend on the density of rain and river gauges. We understand that as of 2019, GDC has 38 telemetered river level gauges and 60 telemetered rainfall gauges (GDC 2023). We have not explored the required density and distribution of gauges that would be required to determine accurate levels of 'flash' response.

5 Recommendations to help improve Flood Warning Officer preparedness for event response

This section is informed by all preceding sections, as well as by Chapter 31 of the Pitt Review which provided a comprehensive review of the 2007 floods that impacted the United Kingdom (Pitt 2008). The Pitt Review was commissioned by the UK government to identify the "lessons to be learned" from the flooding events. Many of those lessons learned are applicable to the GDC flood warning manual context (Appendix A).

5.1 Core competencies required for successful event response

The GDC FWOs who were involved in the initial phone conversations and/or the workshop indicated that all current and future FWOs should have baseline core competencies. Because FWOs can join from any part of the council, they often bring different knowledge, experience and skills to the role. As mentioned in Section 3.1, it can be an advantage to have FWOs from outside of the river management/environmental teams because they are less likely to have operational conflicts, which means there will still be people available to perform critical BAU roles during an event in support of the FWO. Regardless of an FWO's background, it is recommended that all FWOs have the following core competencies:

- Basic understanding of hydrological principles.
- Understanding of how to read and interpret weather forecast models.
- Understanding of the inputs to and limitations of the ARROWS.2 flood forecasting model and how to interpret the outputs (or other flood forecasting models that may be used in the future) and communicate associated uncertainties.
- Understanding of the catchments in the region – how they respond to rainfall, the communities or assets located in different catchments, and the locations of gauges where trigger levels are recorded.
- Know how to communicate uncertainties to CDEM and other decision-makers.

If GDC undergoes flood response staff role clarifications (Section 3.3), we recommend that GDC take that as an opportunity to also review core competencies required for FWOs and other roles associated with flooding response.

5.2 Pre-event training

As indicated in Section 3.1, GDC FWOs would like to receive formalised onboarding for new FWOs, as well as training for continuous improvement of current and future FWOs. Prior to an event, FWOs should have the opportunities to attain the skills required for effective event management.

The GDC FWOs involved in the phone conversations and/or workshop indicated that the following items would be helpful onboarding or training items:

- Training with MetService: how they run and interpret their weather models, including uncertainty.
- Training with the ARROWS.2 flood forecasting model (or any other flood forecasting model that may be used in the future): how to input weather data input and to

interpret model results, including understanding uncertainties and limitations associated with the model.

- Data training: understanding what data is available (e.g., rainfall, river flow, telemetry data), where data comes from, how it is used in the FWO role, and how to interact with the FIO for more information when needed.
- Mock events: scenario training with all key players, including TEMO/CDEM and other emergency services providers either at the local scale or as part of a larger, cross-region or nationally organised event (if applicable).
- Out-of-region training: shadowing of, support for, or joint training with other councils.
- Shadowing of experienced FWOs by junior FWOs during an event (e.g., allow more junior FWOs to observe more experienced FWOs during an event, without being responsible for taking actions).

The FWOs indicated that their team needs someone to be responsible for organising training each year. At present, the FWOs do not have a 'team leader' or other personnel who might be given the role of planning and facilitating training events for the team each year. We recommend that someone – either inside or outside of the FWO team – take on this responsibility.

The FWOs would like to see all training be supported by an FTE component of their jobs (Section 3.1). Training should be supported and expected, as a requirement for being an FWO, so that staff can keep up to date with best-practice procedures and be adequately prepared to respond should an event arise.

5.3 Operational role leading up to and during flooding events

As stated in Section 3, the FWOs involved in phone conversations and/or the workshop indicated that the manual is straightforward to follow during events. In terms of the operational role of the FWO leading up to and during declared flooding events for which response is needed, the main additions that could be made to the manual include:

- Guidance on the lead-up to Severe Weather "Warning" alerts (discussed in Section 2 and Table 2-2).
- Guidance on how to upscale resources during large spatial (e.g., widespread) or temporal (e.g., long-lasting) events (discussed in Section 3.2).
- Formalised shift handover when a new FWO comes on duty (discussed in Section 3.2).
- Better alignment of incident control meetings with incoming data updates.
- Better integration of technology to take some actions off the FWO (e.g., automated scripts for eTXT messages; automated issuance of eTXT messages when trigger levels are reached).

One FWO indicated that in a previous event, the team had a few update meetings using 'old' data (e.g., weather data), and 'new' data would arrive shortly after the meeting. The new data had to be communicated to various parties, but delivering advice out of alignment with the newest data posed a challenge. We understand that GDC have been in contact with MetService to discuss ways to

increase frequency of data communication, as well as to gain clarity around when to expect incoming data to better allow for aligning meetings. River response time (Section 4.2.1) may be a useful tool to guide FWOs in informing MetService how quickly they need data updates, e.g., for rivers that respond more quickly, the FWOs may need more frequent forecasting or data updates.

The manual currently provides the trigger point at which FWOs are to issue messages to the community via the eTXT platform (GDC 2023). The manual suggests that the eTXT platform contains standard messaging text for the different rivers (GDC 2023, Appendix 2) but the manual does not include the text for the different templates. It might be useful if the templates are included in the manual so that FWOs know ahead of time what those messages say. eTXT templates could be included as part of Appendix 2 in the manual. Additionally, one FWO indicated it might be helpful if the eTXT system could automatically issue eTXT at trigger points. We recommend that GDC consider this option, however, it must be considered that the trigger points often occur when a river reaches a specific stage *and* is expected to continue rising. There might be some potential for miscommunication by automatically issuing eTXTs if a river reaches the trigger stage but does not then continue to rise. Additionally, as discussed in Section 3.3, there seems to be some overlap in ownership of the eTXT platform, with the FWO issuing eTXTs and TEMO/CDEM monitoring the success of eTXT delivery. It may be worth FWOs and CDEM discussing if any changes to eTXT ownership could streamline the eTXT service. If FWOs and TEMO/CDEM are happy with the current setup, then it can be retained, but may require clarification in the manual.

As mentioned in Section 3.1, FWOs indicated that post-event debrief should be a mandated component of their role. As such, holding a post-event debrief is considered as an operational improvement to the role, but we recognise that this role component would take place after a declared flooding event ended.

5.4 Other recommendations

In addition to the recommendations outlined above as per Scope Items 3-5 (Table 1-1), additional recommendations identified during conversations with key GDC staff include:

- Growth of the FWO team: currently, there are six FWOs. In a large event that requires a second on-duty FWO and shift rotation, most of the FWO team will end up being involved in event response.
- Consider how external people (e.g., FWOs or similar staff from unaffected regions) could assist in event response (i.e., incoming support) and how GDC FWOs or similar staff could assist during out-of-region events (i.e., outgoing support/possible training for GDC staff) in a reciprocal relationship.
- Recommend formalised support for FWO role (Section 3.1) and, if appropriate, increasing the incentive for more staff to join the FWO team (e.g., Cave n.d.).
- Review of the stage level trigger points in the manual: ensure the trigger stages are still relevant and account for any changes to flood protection infrastructure or natural changes in the river systems. Assess if trigger stages are still relevant under changing river flow, climate, and sea level conditions (as applicable). Also consider including other catchments in the manual and how to determine trigger points (use existing gauges, establish new gauges, or determine another method if the catchment is ungauged).

- Considering measures for redundancy in the flood observation system and protocols for what to do if communications lines (e.g., telemetry) shut down.
- Consider upgrading the flood flow forecasting capabilities to a system that can incorporate forecasts over the entire catchment and integrate ensemble forecasts from different providers.
- Ensure the flood warning manual is aligned with New Zealand's official framework for incident management, the Coordinated Incident Management System (CIMS) third edition (e.g., where the FWO fits into the CIMS structure and who they may be providing information to at different levels of response).
- Further update to the flood warning manual following this external review.
- Review recommendations in the 2008 Pitt Review (Pitt 2008) to determine if there are any points that could be applied to the GDC flood warning manual or other operational documents.

The above recommendations are intended to contribute to GDC's ongoing commitment to improving their flood warning and response services. As mentioned in Section 4.1, we also encourage GDC to incorporate findings from the work being carried out by the National Flood Warning Steering Group and the River Managers Group to review Regional Council and Unitary Authority flood procedures across New Zealand. We understand that results from this work (contracted to Tonkin & Taylor Ltd.) are expected in July 2024.

6 Conclusions

This report aimed to assess the GDC flood warning manual (both pre- and post- Cyclone Gabrielle versions) by working in partnership with GDC. To achieve this review, we identified changes to the manual made following Cyclone Gabrielle, assessed the GDC flood warning manual against other flood warning documents from other select councils and against the FWIS, and through conversations with key GDC staff.

As a result of the review, we recommend the following overarching items to contribute to ongoing improvement of the flood warning manual and associated activities:

- Provide greater imperative to the FWO role by stipulating in the manual the requirement for FWO duties to take priority during incident response.
- Provide guidance for resource upscaling when event magnitude (spatial and/or temporal) escalates.
- Clarify the roles and responsibilities of FWOs and other staff involved in incident management, including what people *are* and *are not* responsible for and how the roles interact.
- Make the manual a dynamic document: require post-event updates to the manual, make the manual more impact focused.
- Ensure that current and future FWOs have the necessary core competencies.
- Ensure that current and future FWOs have the appropriate support and opportunity to attend required training.
- Align the flood warning manual with national approaches to flood management: this item will likely need to be dynamic through time and will be informed by the outcomes of work to review Regional Council and Unitary Authority flood procedures across New Zealand as well as any updates to the CIMS framework into the future.

Throughout this review process, it has been clear that FWOs and other GDC staff involved in event response are dedicated to and engaged with improving their flood response procedures. Many of the recommendations provided in this report were identified directly by GCD FWOs and other staff, indicating sound knowledge of the requirements for effective flood response. Other recommendations were determined in collaboration between GDC staff and NIWA staff who specialise in flooding hazard and river geomorphology. We recommend that the FWO team be involved in any future updates to the flood warning manual, given their collective knowledge and expertise, as well as being the main users of the document. The manual needs to be workable and achievable in order to provide the best possible outcomes for both response staff and the wider community.

7 Acknowledgements

We express our gratitude to the following councils for sharing some of their flood warning documentation with us for the purposes of this work (e.g., Section 4.1): Greater Wellington Regional Council, Waikato Regional Council, and Hawke's Bay Regional Council. We also thank Teresa Simcox of Toa Consulting for facilitating knowledge-sharing between us and these councils.

We also thank the GDC staff who were involved in the phone conversations and workshop for their time and contributions to this work.

8 Glossary of abbreviations and terms

AEP	Annual exceedance probability
ANZEMC	Australia New Zealand Emergency Management Committee
CIMS	Coordinated Incident Management System
CDEM	Civil Defence Emergency Management
ECC	Emergency Coordination Centre
FIO	Flood Information Officer
FWIS	Flood Warning Infrastructure Standard
FWO	Flood Warning Officer
GDC	Gisborne District Council
GWRC	Greater Wellington Regional Council
HBRC	Hawke's Bay Regional Council
MBIE	Ministry of Business, Innovation & Employment
TEMO	Tairāwhiti Emergency Management Organisation
TOC	Time of concentration
TTP	Time to peak
WRC	Waikato Regional Council

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WRC (Waikato Regional Council) (2023B) Role Description: Regional Flood Coordinator (Flood Manager). Internal Document – Confidential – provided by WRC.

Appendix A Recommendations of the 2007 UK flood review and applicability to the GDC Flood Warning Manual

The Pitt Review (Pitt 2008) includes a comprehensive list of recommendations informed by the 2007 UK floods. Here, we provide an abridged list of the recommendations in the Pitt Review that we interpret as most applicable to the GDC flood manual and/or the FWO role. We acknowledge that there may be additional recommendations in the Pitt Review that GDC finds useful, but also acknowledge that many of the recommendations lie beyond the scope of the GDC flood manual or of GDC as an organisation. We recommend that GDC review the Pitt Review to identify which recommendations might be used as guides for potential improvements, either specifically to the manual or to the wider organisation.

Recommendation (Pitt Review)	Applicability to GDC Flood Warning Manual and/or FWO role
(1) Given the predicted increase in the range of future extremes of weather, the Government should give priority to both adaptation and mitigation in its programmes to help society cope with climate change.	This point could feed into the manual's mandate that flood response duties (prior to, during and after an event) are of critical importance to society.
(3) The Met Office should continue to improve its forecasting and predicting methods to a level which meets the needs of emergency responders.	Improved frequency of MetService data to councils, including the timing of data/forecast information.
(4) The Environment Agency should further develop its tools and techniques for predicting and modelling river flooding, taking account of extreme and multiple events and depths and velocities of water.	Improvement to flood flow forecasting tools that can incorporate ensemble forecasting.
(5) The Environment Agency should work with partners to urgently take forward work to develop tools and techniques to model surface water flooding.	NIWA has a prototype national flood flow forecasting capability that could potentially be used by councils in the future, but this requires further national level funding. GDC is looking at updating ARROWS.2; they could consider developing their own flood forecasting system.
(16) Local authorities should collate and map the main flood risk management and drainage assets (over and underground), including a record of their ownership and condition.	Include flood asset maps as part of the manual, as an appendix, or as an external document with a reference ID that sits within the manual. FWOs would likely benefit from some knowledge of the flood risk management assets in the region.
(19) Local authorities should assess and, if appropriate, enhance their technical capabilities to deliver a wide range of responsibilities in relation to local flood risk management.	For GDC to discuss across the FWO and CDEM teams, to incorporate into future training requirements.
(28) The forthcoming flooding legislation should be a single unifying Act that addresses all sources of flooding, clarifies responsibilities and facilitates flood risk management.	If any new legislation related to flooding is released, the flood warning manual may need to refer to this legislation in role descriptions to align with national approach.

Recommendation (Pitt Review)	Applicability to GDC Flood Warning Manual and/or FWO role
(33) The Environment Agency should provide a specialised site-specific flood warning service for infrastructure operators, offering longer lead times and greater levels of detail about the velocity and depth of flooding.	The flood warning manual already describes communication requirements between FWOs and infrastructure/asset managers. Possibly consider reviewing if the information shared is sufficient for infrastructure/asset managers to accomplish any required tasks.
(34) The Met Office and the Environment Agency should issue warnings against a lower threshold of probability to increase preparation lead times for emergency responders.	The 2023 version of the manual indicates that FWOs take their first action when the MetService issues a "Heavy Rain Warning". Could consider providing more information about if FWOs need to be preparing during lower threshold notifications.
(35) The Met Office and the Environment Agency should issue joint warnings and impact information on severe weather and flooding emergencies to responder organisations and the public.	Potentially relevant to the messages that are sent to the public via the eTXT system. GDC to review if there are opportunities to align messages with MetService warnings and expected impacts if not already applicable.
(37) The Environment Agency should work with its partners to progressively develop and bring into use flood visualisation tools that are designed to meet the needs of flood-risk managers, emergency planners and responders.	Flood visualisation data should be made available, where possible, to response staff. The manual could stipulate who is responsible for providing this data to whom.
(41) Upper tier local authorities should be the lead responders in relation to multi-agency planning for severe weather emergencies at the local level and for triggering multi-agency arrangements in response to severe weather warnings and local impact assessments.	Ensure that roles and responsibilities, including communication pathways, are clearly identified.
(44) Category 1 and 2 responders should assess the effectiveness of their emergency response facilities, including flexible accommodation, IT and communications systems, and undertake any necessary improvement works.	Relates to training, e.g., mock events, to ensure that the systems in place are sufficient to respond to events.
(66) Local authority contact centres should take the lead in dealing with general enquiries from the public during and after major flooding, redirecting calls to other organisations when appropriate.	Specify who the appropriate person is for managing public enquiries during an event (e.g., CDEM).
(75) For emergencies spanning more than a single local authority area, Government Offices should ensure coherence and coordination, if necessary, between recovery operations.	Consider integrating CIMS framework into the manual, where appropriate.

Recommendation (Pitt Review)	Applicability to GDC Flood Warning Manual and/or FWO role
(78) Aims and objectives for the recovery phase should be agreed at the outset by Recovery Coordinating Groups to provide focus and enable orderly transition into mainstream programmes when multi-agency coordination of recovery is no longer required.	Post-event debriefs to be included as a necessary role during event recovery.
(81) There should be an agreed framework, including definitions and timescales, for local/central recovery reporting.	A template or framework for post-event debriefing could be included in the manual.
(92) Local Resilience Forums should evaluate and share lessons from both the response and recovery phases to inform their planning for future emergencies.	Allow public information to be included in event debriefs, where appropriate. Allow event response staff to share their own lessons-learned as part of planning for future event response.

Review of Tairāwhiti Civil Defence Emergency Management Group Plan

3 September 2024

Logicus NZ

Purpose

The purpose of this document is to seek direction from the Tairāwhiti Civil Defence Emergency Management Group (CDEM Group) on a proposed new approach and structure for the Tairāwhiti Civil Defence Emergency Management Group Plan (the Group Plan). This document positions the Group Plan within a revised emergency management framework.

CDEM Group Plans

CDEM Group Plans are the pre-eminent document for emergency management at a regional (CDEM Group) level. Every CDEM Group is required to have a CDEM Group Plan "to enable effective, efficient and coordinated CDEM delivery at a Group level".

Under law, a CDEM Group Plan has to have certain features including:

- the hazards and risks to be managed by the Group
- the emergency management needed to manage the hazards and risks
- the strategic planning for recovery from the hazards and risks
- objectives of the plan and how they relate to the national CDEM strategy
- how local authorities will share costs for the activities of the Group
- the arrangements for declaring a state of emergency and notifying a transition period.

It must also not be inconsistent with the national CDEM strategy, and it must take account of national guidelines, codes or technical standards. It must be reviewed at least every five years.

Current issues and opportunities

Review overdue

The Tairāwhiti CDEM Group Plan (the Group Plan) was last reviewed in full in 2016. We are overdue to review this under the Civil Defence Emergency Management Act 2002 (the Act). The five-year review clauses are intended to ensure regular revisiting of approaches to emergency management as groups respond to and anticipate environmental, social, political, economic and technological changes.

Capturing innovation

Since the last review of the Group Plan, the emergency management landscape has changed significantly, both nationally and regionally, and we have learned a lot. Operationally, our emergency management practices have evolved with some of the innovations garnering national attention as examples of best practice. The Group Plan is yet to reflect these learnings and is out of date.

Telling the story

As our operations have evolved, they are signalling a significant change in approach to emergency management. Yet there is no cohesive big picture explanation of our approach as a region. The story of Tairāwhiti emergency management needs clarifying and promotion.

Relevant to audience

The different layers involved in emergency management (governance, management, operations) have responsibilities for different aspects of emergency management, so they have different information needs. The Group Plan suffers from trying to be all things to all people – it has strategic information and layers of operational information. As a result, it does not deliver for the different audiences who admit to rarely using it. Information needs to be targeted to the right audience for maximum effect.

Streamlining and accessibility

There are more than a dozen emergency management plans in play currently. These range from high level documents that cover all emergencies across the region to contingency plans for identified hazards to procedural plans for specific activities such as evacuation. These plans are not integrated and do not talk to the Group Plan or to each other as well as they could. The plethora of documents

adds to confusion and inaccessibility. There needs to be a more sophisticated approach to emergency management planning with a clear and navigable system of documents targeted to the needs of different emergency management actors.

Clarifying roles and responsibilities

Recent emergency events have created some ambiguity around roles and responsibilities for emergency management in Tairāwhiti. Some of these roles are determined in statute however there is scope to have bespoke structural arrangements that fit with the local context. This needs to be sorted as soon as possible.

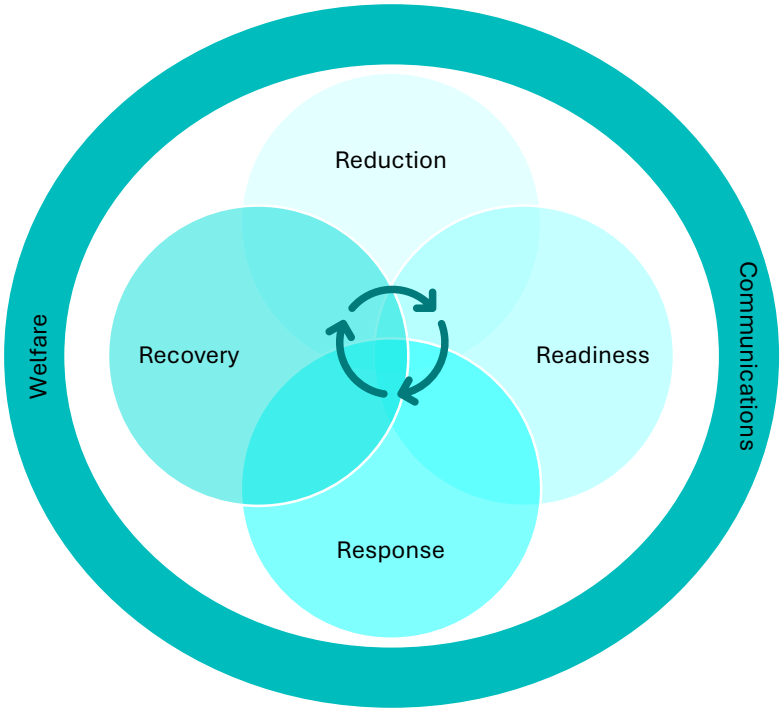
Ongoing government reform

The government has had reform of the emergency management system underway since 2017. However, changes of government and of ministers have resulted in policy swings that have been difficult to anticipate. The current government is continuing with its programme of reform. This represents an opportunity to ensure that what works for our region (as captured in our Group Plan) is facilitated by any change in government policy and legislation. So concerted action to complete a draft Group Plan before the end of 2024 and to continue to engage with ministerial officials throughout the process is important.

Key proposed changes

Emergency management framework

The diagram below illustrates the proposed emergency management framework for Tairāwhiti. The framework uses the emergency management four Rs of Reduction, Readiness, Response, and Recovery.



It is based on the concept that emergency management happens in phases and is ongoing and cyclical. It does not stop in between responses to emergency events: we are just in a different phase of the cycle reducing risks and preparing for the next event.

It recognises that the emergency management phases are interconnected and overlap with each other. And it recognises that there are two core functions (welfare and communications) that cut across the emergency management phases and that these are so critical for Tairāwhiti that they warrant a visible presence in the framework.

Community empowerment

The Group Plan recognises that in many emergency situations, local communities are the first responders and need to be prepared and resourced to be able to be self-supporting.

This Group Plan does not contemplate having separate emergency management systems administered by different parties within the region – a joined-up emergency management framework is the recommended option.

Instead, we recommend using the concept of subsidiarity - that decision-making authority is best placed:

- where responsibility for the outcomes lies
- as close as possible to the actions that will produce the outcomes.

There is a need to empower local communities to engage across the emergency management phases while balancing this with the fact that the accountability for effective emergency management currently lies with local authorities and NEMA.

Implementation planning

We recommend including a requirement for implementation planning within the Group Plan so that the emergency management activities that need to happen to deliver the Group Plan and the EMPs have the resources needed to be implemented.

This requires linking emergency management planning with the budget cycles of core funders - NEMA and GDC. It also requires other stakeholders within the emergency management framework to commit skin in the game with resources to support effective planning and delivery.

Agility and continuous improvement

We recommend that the Group Plan explicitly recognises the importance of the emergency management framework being a learning system that is agile in responding to lessons learned from experience.

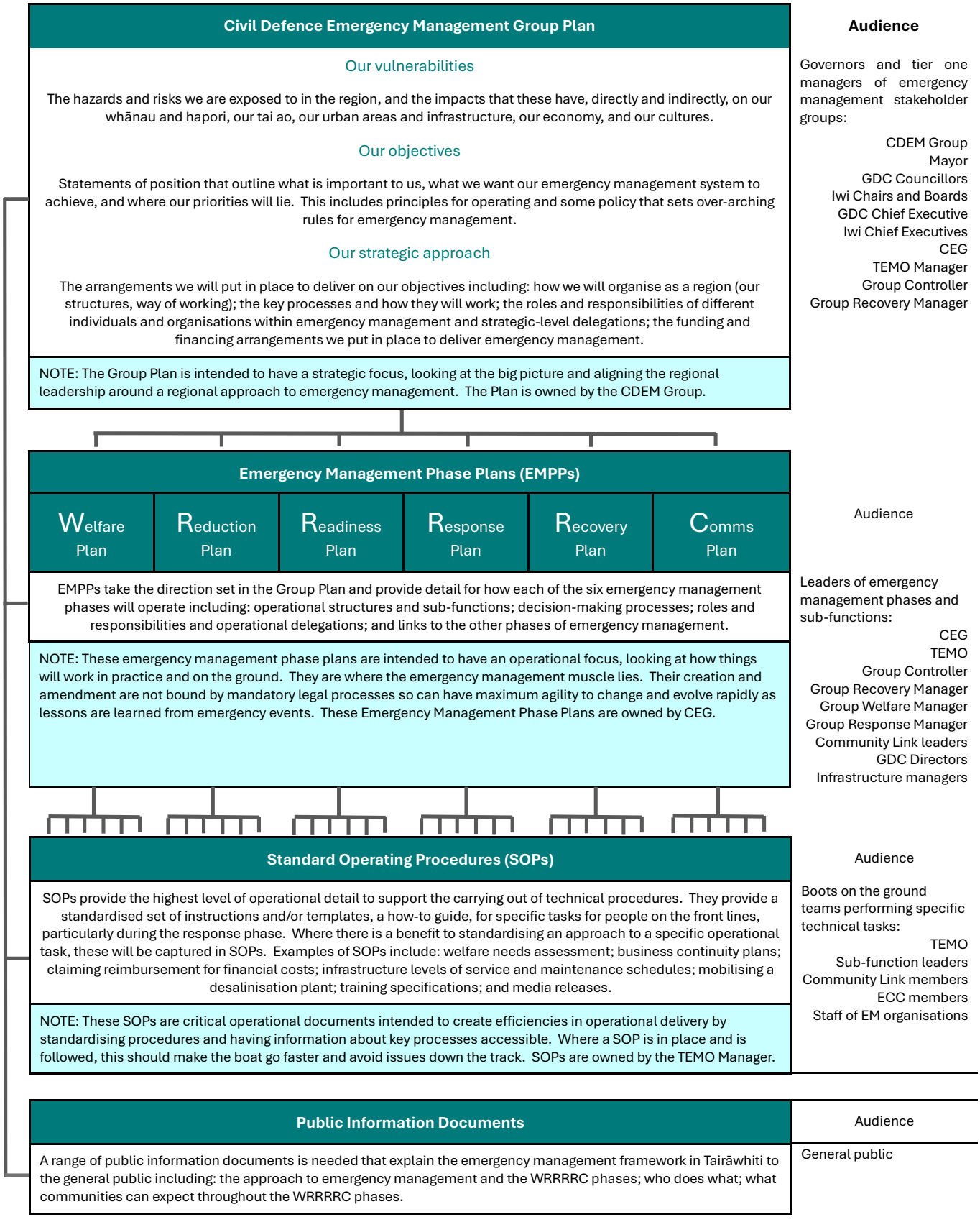
The approach recommended is to make the Group Plan a strategic level document that sets the direction for emergency management in the region and that is agreed with the community. Underneath this would sit detailed operational plans and procedures that are adjusted in response to lessons learned and community feedback. While adjustments and changes would be communicated with those affected, there would not be general public consultation.

The document hierarchy on the next page explains how this would work in detail.

We also recommend embedding internal reviews into practice in a more formalised way than currently exists.

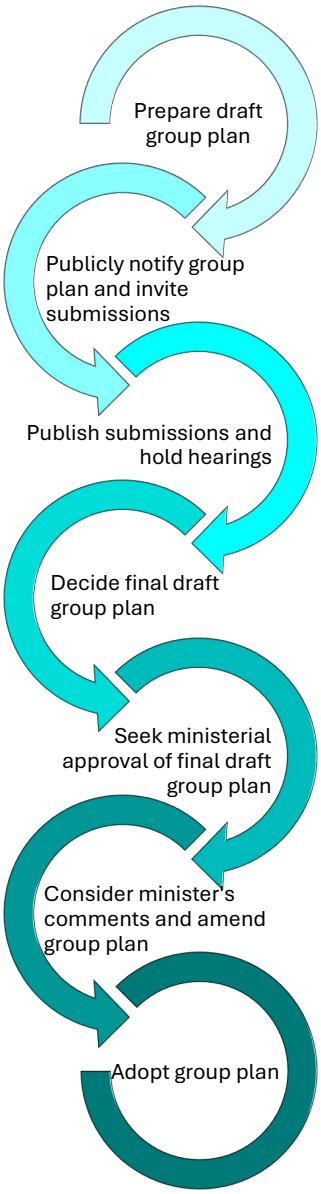
Proposed document hierarchy

The diagram below shows the proposed hierarchy of documents that would help give effect to the proposed new emergency management framework.



Timeframes

The Act prescribes the process for preparing a CDEM Group Plan as outlined in the diagram below:



The table below outlines where we are up to in this process and the estimated timeframes to completion.

Stage	Description	Completion (est.)
Stage 1	Research	√
Stage 2	Concept	√
Stage 3	Drafting	October 2024
Stage 4	Consultation	December 2024
Stage 5	Implementation planning	December 2024
Stage 6	Approval	February 2025

Te Kaunihera o Te Tairāwhiti
GISBORNE
DISTRICT COUNCIL

24-240

Title: **24-240 Recovery Update**

Section: Recovery

Prepared by: James Thompson - Recovery Office Manager

Meeting Date: Tuesday 3 September 2024

Legal: No	Financial: No	Significance: **Medium**

Report to CIVIL DEFENCE EMERGENCY MANAGEMENT GROUP/KAIWHAKAHAERE OHOTATA WHAKAMARU TŪMATANUI for information

PURPOSE - TE TAKE

The purpose of this report is to provide an overview of the region's Recovery Plan. A **presentation** will be delivered by the Recovery Programme Director that provides more detail on the depth and breadth of the recovery programme of work and the challenges.

SUMMARY - HE WHAKARĀPOPOTOTANGA

The decisions or matters in this report are considered to be of **Medium** significance in accordance with the Council's Significance and Engagement Policy.

Portfolio Overview

Having started the implementation of the next iteration of the recovery structure to enable recovery activities to transition into the business-as-usual activities of Gisborne District Council (Council), recruitment has begun for identified roles to build capacity and capability within Council. Where possible to provide cost savings a number of contractors' contracts have come to an end.

Recovery Progress Table:

	Status	Comments and Status Rationale
Woody Debris		Due to weather conditions over the month, there has been limited extraction and burning. Budget Status has improved from Amber to Green with an additional $18m released via Department of Internal Affairs (DIA). Also, DIA have given an extension until 31 December 2024 for funding packages. Both Stakeholders and Resources status have change from Green to Amber.
Roading Network		The current funding may not cover the full list of Red/Orange bridges. Both Green and Black bridges' funding applications have been approved

	Status	Comments and Status Rationale
Tiniroto Project		Phase one temporary road reopening works are now complete. $45,000,000 CIP funds allocated to project.
FOSAL		Category 3 Buyouts are progressing well with just over 55% of properties settled. House lifting applications are open with 94 applications received to date and verified to progress with assessment. 76% of the Commercial Sediment and Debris project is complete.
Flood Resilience		Going into winter construction earthworks for the Waipaoa is 'on-hold', work to restart in spring. Hydraulic modelling continues for the Te Karaka and 'Optioneering' work to start in July. A flood resilience investigation funding application is awaiting approval, and an additional application is being discussed with Crown Infrastructure Partners (CIP).
Community Led Recovery Plans		21 plans have been shared with Council of which 19 plans can be shared with regional public service and other partners. Ongoing discussions are being had with other groups that may want to develop and share a plan.

RECOMMENDATIONS - NGĀ TŪTOHUNGA

That the Civil Defence Emergency Management Group/Kaiwhakahaere Ohotata Whakamaru Tūmatanui:

1. Notes the contents of this report.

Authorised by:

Tim Barry – Director Lifelines

Keywords: Recovery Update, Community led recovery plans, FOSAL, Flood Resilience , Tiniroto project, Roading network, woody debris

BACKGROUND - HE WHAKAMĀRAMA

1. The Recovery Office was established to aide and support the regions recovery from Cyclone Gabrielle. Multiple versions of Regional Recovery bids were developed to inform Government of our region's requirements for funding. Subsequently funding has been provided for enabling portions of recovery to be carried out.

DISCUSSION and OPTIONS - WHAKAWHITINGA KŌRERO me ngā KŌWHIRINGA

2. A review was underway to consider the resources required to deliver on the scope of the recovery efforts. After considerations a change was implemented to move into the next iteration of the recovery structure to enable recovery activities to transition into the business-as-usual activities of Gisborne District Council (Council).

Woody Debris

3. Council is a part of a multi-agency response to addressing the significant amount of woody debris in our waterways and beaches across the region.

4. Total estimated volume in active sites and pending is 535,768.6 tonnes, with 436,851 tonnes already extracted (as of 4 August 2024), 92% of the volume in active project areas.

5. The first week of the new quarter has been slow due to residual effects from the June 2024 weather event, production levels are starting to increase.

6. The key areas of Waikanae and Midway beaches are currently being cleared, with more extensive clearing planned from mid-September in anticipation of the busy summer period. Additionally, plans are underway to remove woody debris at Kaiti beach and Ūawa north beach, while the clearing of Ūawa south beach continues as scheduled. Fulton Hogan has completed the removal of debris from the Wainui Stream, material has been transported for chipping. The Midway Surf Club frontage (a 200m section of beach) and the area from the Turanganui River mouth to 100m west of Grey Street are now cleared of all woody debris and raked to a clean condition.

7. The original estimate of 1.4M m^3 of woody debris is still being validated, with volumetric assessments for the Uawa/Hikuwai, Waiapu, and Te Arai catchments completed following the rapid assessment flight.

Roading Network

8. Landslides, floods, and heavy rain caused roads to collapse and bridges to be destroyed during Gabrielle. A detailed assessment of our region's 424 bridges revealed that 62 bridges were affected. In addition, erosion affected more than 250 sections of our network. To date we have secured funding of just under $200m. We are completing a strategic review of the roading network, identifying priority areas, and developing a priority framework. By September 2024, NZTA will be finalising funding based on our business cases for the next programme of reinstatement.

Project	Rationale	Capped $ Value
Black Bridges	Connecting communities that have been cut off and using temporary pathways/fords.	23,000,000
Red/Orange Bridges	The bridges require strengthening, connecting communities and prioritised according to the list. In total 90 bridges now identified.	17,500,000
Green Bridges	35 bridges received superficial damage due to Cyclone Gabrielle. The Green Bridge Programme will undertake repairs for these bridges.	1,000,000
Tiniroto Road	Alternate to SH2 (State Highway 2) South. Connects with Wairoa. Includes business case funding.	45,000,000
Dropouts	Dropouts caused by Cyclone Gabrielle and subsequent weather events in corridors with lower volumes.	8,500,000
Iwi Projects	Agreed package with iwi that provides greater resilience to communities.	27,000,000

9. We are currently assessing the new damage to the network caused by June 2024 weather event, determining what needs to be done, and allocating resources accordingly. Our prioritisation process considers various factors, including safety, road usage, school bus routes, alternative routes, and connectivity between areas. During weather events, we often do not receive the necessary funding and must operate within strict financial limits, prioritising repairs based on necessity and affordability. The June 2024 weather event caused deterioration at numerous sites across the network. Our team has been inspecting and scoping the required works, and crews have been instructed to make the sites safe while we seek long-term fixes and funding. The revised information will be uploaded to RAMM.

10. A planning assessment of the two options for Tiniroto Road at the Hangaroa Bluffs has been commissioned to determine long-term solutions, incorporating further engagement with mana whenua.

FOSAL

11. Applications for the Elevating Tairāwhiti Fund are now open, approximately 93 verified applications have been received. A revised version of Elevating Tairāwhiti Policy has been adopted and the process is being developed.

12. As of 11 August 2024, 30 (55.6%) Category 3 properties settled. Tender for Demolition Services Panel closes on 28 August 2024. Proposals for house removal close on 13 September 2024. Over 50% of asbestos surveys are complete. The process for not-for-profit local organisations to recycle or repurpose materials from Council-owned Category 3 homes has started internally.

13. All Commercial Sediment and Debris applications are paid, and the Council audit process has commenced to enable the completion of this project.

Flood Resilience

14. In February 2024, the Waipaoa funding application for $20.46m was approved, followed by the approval of the $13.2m Te Karaka funding application in July 2024. The $11m funding application for Flood Resilience Investigation is still awaiting ministerial approval from the Government.

15. Flood resilience improvement investigations have been identified for 11 project areas across the Tairāwhiti region, spanning from Tikitiki to Te Arai. Provisional government funding has been allocated to these projects. Communities will be notified as funding applications are approved and investigations move forward.

16. Waipaoa stopbank upgrades first started in 2019. In February $20.46m of further funding was approved to upgrade the remaining 28km of Waipaoa River stopbanks (all on the western side of the river upstream of the Matawhero (SH2) Bridge). Weather permitting this work is expected to be completed by June 2027. Procurement is underway now to secure 5.5km of Waipaoa stopbank upgrade work in the Waituhi area to be constructed over the 2024/25 summer. Waipaoa stopbank construction works are on-hold for winter, works to restart in September/October 2024. Approximately 4km of stopbank upgrades required to complete this existing contract.

17. The flood modelling work for Te Karaka is now well advanced. Starting from mid-July, we will begin assessing potential flood scheme upgrade options, such as stopbank upgrades. The delivery of flood scheme improvements is likely to be two to three years away. 'Optioneering' work to commence from Mid-July onwards. Hydraulic modelling work is also well advanced for the Taruheru/Waimata catchments.

Community Led Recovery Plans (CLRPs)

18. Of the 21 plans received, 19 can be shared with our external partners. We are engaging with communities to understand how their priorities can be met within Council's existing work programmes and investigating external funding avenues to support priorities outside Council's responsibility. There has been continued engagement with communities who previously did not have capacity to participate. There are planned engagements with CLRP communities who participated in Council's 2024-2027 Three-Year Plan engagement process.

ASSESSMENT of SIGNIFICANCE - AROTAKENGA o NGĀ HIRANGA

Consideration of consistency with and impact on the Regional Land Transport Plan and its implementation
Overall Process: **Medium** Significance
This Report: **Low** Significance

Impacts on Council's delivery of its Financial Strategy and Long Term Plan
Overall Process: **Medium** Significance
This Report: **Low** Significance

Inconsistency with Council's current strategy and policy
Overall Process: **Low** Significance
This Report: **Low** Significance

The effects on all or a large part of the Gisborne district
Overall Process: Medium Significance
This Report: Medium Significance

The effects on individuals or specific communities
Overall Process: Medium Significance
This Report: Medium Significance

The level or history of public interest in the matter or issue
Overall Process: Medium Significance
This Report: Medium Significance

19. The decisions or matters in this report are considered to be of **Medium** significance in accordance with Council's Significance and Engagement Policy.

TREATY COMPASS ANALYSIS

Kāwanatanga

20. Early in this Recovery process, Council and Iwi collectively put forward priorities for funding to be considered by Central Government0. Where funding has been allocated, those entities that proposed the priorities are involved in decisions on how the funds are used.

Rangatiratanga

21. As recovery work is operationalised mana whenua are included to give feedback of what happened during Cyclone Gabrielle to better inform and give direct input into the options to remediate the impacts and collaboratively deliver resilient outcomes.

Oritetanga

22. When priorities align more effectively by supporting Iwi to deliver programmes of work in their rohe, discussions with funders have focused on developing funding agreements that match this approach.

Whakapono

23. Community led recovery planning has provided opportunities to understand the aspirations of whanau. Consistent engagement with mana whenua throughout the delivery of the recovery programmes will ensure expectations are met.

TANGATA WHENUA/MĀORI ENGAGEMENT - TŪTAKITANGA TANGATA WHENUA

24. Recovery programmes are incorporating engagement with iwi at an operational level and through community led recovery planning.

COMMUNITY ENGAGEMENT - TŪTAKITANGA HAPORI

25. Continuation of regular communication with the community particularly with the FOSAL category 2 and 3 owners. Further progress has been made with 21 community led recovery plans that have been shared with Council.

CLIMATE CHANGE – Impacts / Implications - NGĀ REREKĒTANGA ĀHUARANGI – ngā whakaaweawe / ngā ritenga

26. This has been factored into programme deliverables.

CONSIDERATIONS - HEI WHAKAARO

Financial/Budget

27. Financial forecasting is progressing to a granular operational level to increase the certainty of what projects will cost. This will enable there to be a clearer view of what we can do with current funding and where we need to look for additional funding opportunities.

Legal

28. Agreements for current and any future funding will require legal review to understand our obligations. FOSAL and work programmes require ongoing legal review of processes and policies, contractual arrangements, and communications.

POLICY and PLANNING IMPLICATIONS - KAUPAPA HERE me ngā RITENGA WHAKAMAHERE

29. The matters within this report have policy implications in terms of the redevelopment of the policy for lifting of houses.

RISKS - NGĀ TŪRARU

30. There continues to be funding pressures and issues around clear scope of deliverables across the programme. These are being addressed through changes to the programme structure, ensuring there is clear line of sight at all levels.

31. There is also ongoing communication with funders to provide information for releasing current funding and to explore opportunities for securing more funding.@ari

NEXT STEPS - NGĀ MAHI E WHAI AKE

Date	Action/Milestone	Comments
September 2024	Demolition of houses and residential improvements	
October 2024	Property responsibility transfer to Council's Liveable Communities	Transfer of assets with no current contingency for management and maintenance

ATTACHMENTS - NGĀ TĀPIRITANGA

1. Attachment 1 - CDEM Presentation 03 09 24 [**24-240.1** - 16 pages]

Tairāwhiti Regional Recovery

Recovery Progress Snapshot

	Status	Comments and Status Rationale
Woody Debris		Due to weather conditions over the month, there has been limited extraction and burning. Budget Status has improved from Amber to Green with an additional $18M released via Department of Internal Affairs (DIA). Also, DIA have given an extension until 31 December 2024 for funding packages. Both Stakeholders and Resources status have change from Green to Amber.
Roading Network		The current funding may not cover the full list of Red/Orange bridges. Both Green and Black bridges' funding applications have been approved
Tiniroto Project		Phase one temporary road reopening works are now complete. $45,000,000 CIP funds allocated to project.
FOSAL		Category 3 Buyouts are progressing well with just over 55% of properties settled. House lifting applications are open with 94 applications received to date and verified to progress with assessment. 76% of the Commercial Sediment and Debris project is complete.
Flood Resilience		Going into winter construction earthworks for the Waipaoa is 'on-hold', work to restart in spring. Hydraulic modelling continues for the Te Karaka and 'Optioneering' work to start in July. A flood resilience investigation funding application is awaiting approval, and an additional application is being discussed with Crown Infrastructure Partners (CIP).
Community Led Recovery Plans		21 plans have been shared with Council of which 19 plans can be shared with regional public service and other partners. Ongoing discussions are being had with other groups that may want to develop and share a plan.

Woody Debris

Description

- $35.4m for the removal of woody debris from rivers and beaches to protect our critical infrastructure (bridges, water, pipelines and roads.)

Woody Debris

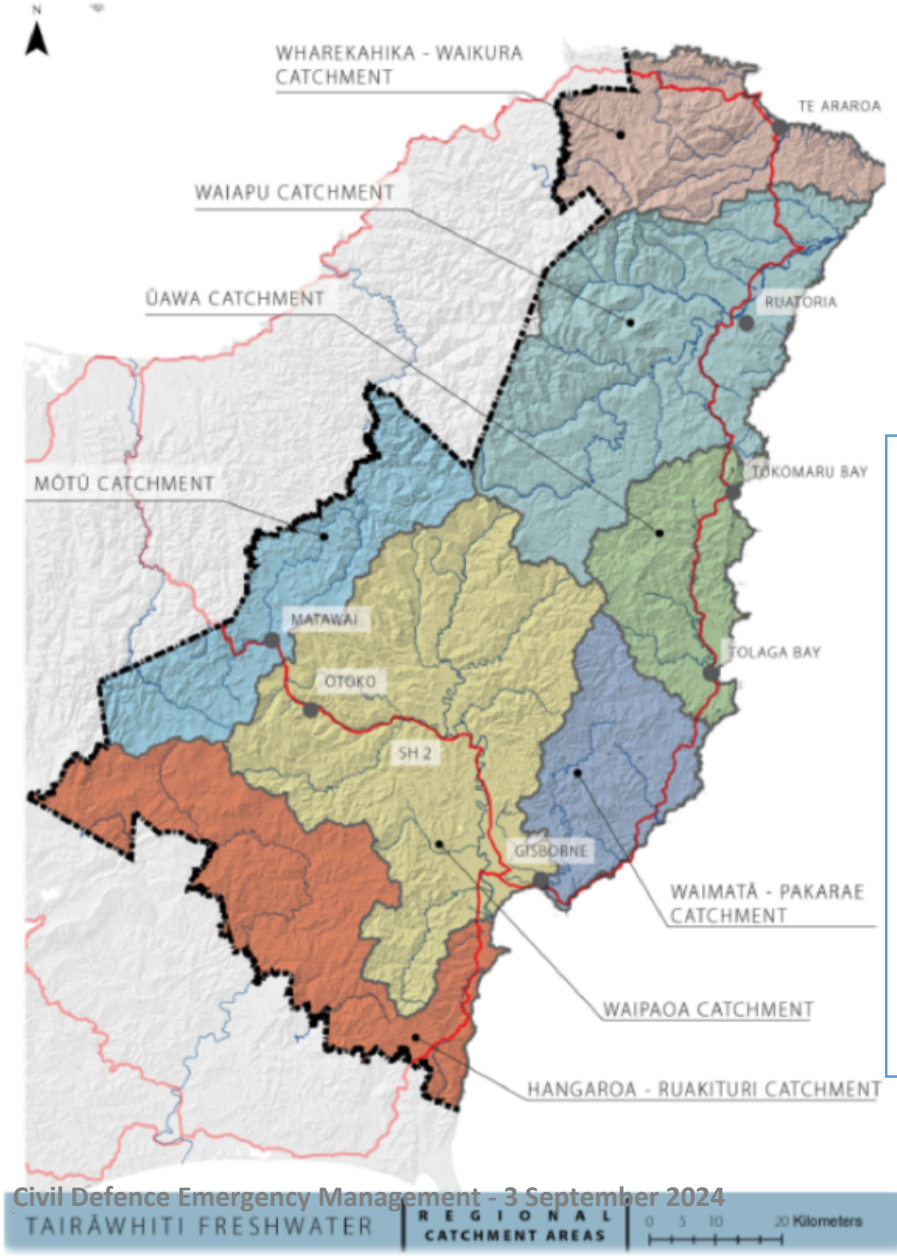
Risks and Issues

- Weather Condition Challenges: Increased rainfall may saturate the ground, hindering machinery mobility and posing risks. High temperatures may place restrictions or completely halt burning activity
- Iwi Partnership: Lack of consideration for Mana Whenua could overlook cultural and environmental sensitivities.
- Community Concern: The ongoing maintenance of recently remediated rivers, particularly in areas like Te Arai and Waimata, poses a significant concern due to the potential regrowth of trees and vegetation, which could obstruct waterways and compromise the effectiveness of restoration efforts.

Next Steps

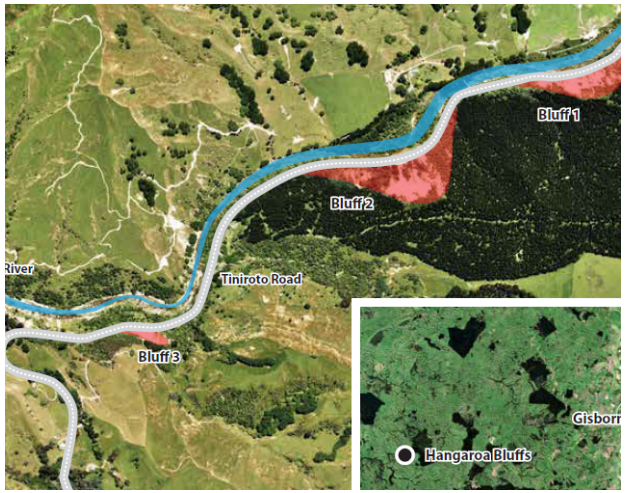
- Project methodologies & contractors will be scrutinised and validated to ensure delivery is of a quality standard and fit for purpose. This will be followed by a full financial review.
- Health and Safety will be prioritised to ensure all participants are striving for continuous improvement. Collaboration with WorkSafe will be ongoing to aid in these improvements.
- Project support and management will continue with Ngāti Porou to ensure they can deliver as per the project framework while ensuring their tikanga is respected.

Tairāwhiti River Catchments



Latest Progress to 4 August 2024

- Total extracted = 436,851 tonnes, 92% of the volume in active project areas.
- Total volume treated via High oxygen or open air burning or Chipping = 407,894, 93% of our extracted volumes.
- Extracted volume awaiting treatment = 28,957 tonnes, 7% of our total extracted volumes.
- Extraction from our beaches = 73,573 tonnes, 17% of the total extracted volume.



Photographs provided by Dr Murry Cave

Tiniroto Road

Description

- Tiniroto Road is considered an alternative route to State Highway 2 and a resilient roading solution is needed. The Government included funding for a resilient solution in the Cyclone Support Package that Council accepted in November 2023.
- The government approved $46M for major repairs to Tiniroto Road and the Bluffs.

Latest Progress

- 'Phase 1a - Temporary Road Reopening' works are complete. Tiniroto Rd is now open to the public.
- 'Phase 1b – Bluff 3 Early Works Package' design investigation programmed; procurement plan underway.
- 'Phase 2 – Principal's Requirements' preparation underway with geotechnical, catchment, hydrological, cost, and procurement considered.

Bridges

- 6.6% of the overall Black Bridges Project is completed
- 48% of Red and Orange Bridges are completed
- 29% of Green Bridges are completed

Dropouts

- Tranche 1 & 2 NZTA dropout repairs are in progress. There are 19 sites of which 14 have been completed. The remaining 5 sites are underway.
- Tranche 3 NZTA dropout repairs are in progress. There are 43 sites of which 7 have been complete.
- A drive over of the Network has been completed for the upcoming Tranche 4 flood damage repair application to NZTA. (These are predominately dropout repairs)
- The team is developing an RFP of the delivery of both the NZTA and CIP funded dropouts – creating a panel of suitable contractors which will reduce the reliance on the maintenance contractors to deliver this work and focus on BAU.

Roading, Bridges and Dropouts

Risks and Issues

- We fail to engage with stakeholders, Iwi and the community appropriately.
- Consenting process takes longer than anticipated resulting in physical works being delayed
- Delays and poor communication with the funder(s) undermines confidence.

Next Steps

- Review and agree the total value of the network wide dropout programme.
- Complete Geotechnical investigations across multiple sites.

FOSAL

House Elevation

- We are lifting houses up to protect them from future flooding events.
- $12,257,102 for the elevating of up to 145 affected properties.

Voluntary Buyout

- Buy Back Funding: $30 million ($15m Government, $15m Government Loan to Council, interest free for 10 years).
- Purchase of 69 damaged residential land and dwellings which pose an unacceptable risk to life (excluding 15 Whenua Māori and Marae Pathway properties). As at 11 August 2024:
  - 30 properties settled (or purchase completed)
  - 23 at varying stages of negotiations
  - 1 negotiation not started

Commercial Sediment & Debris

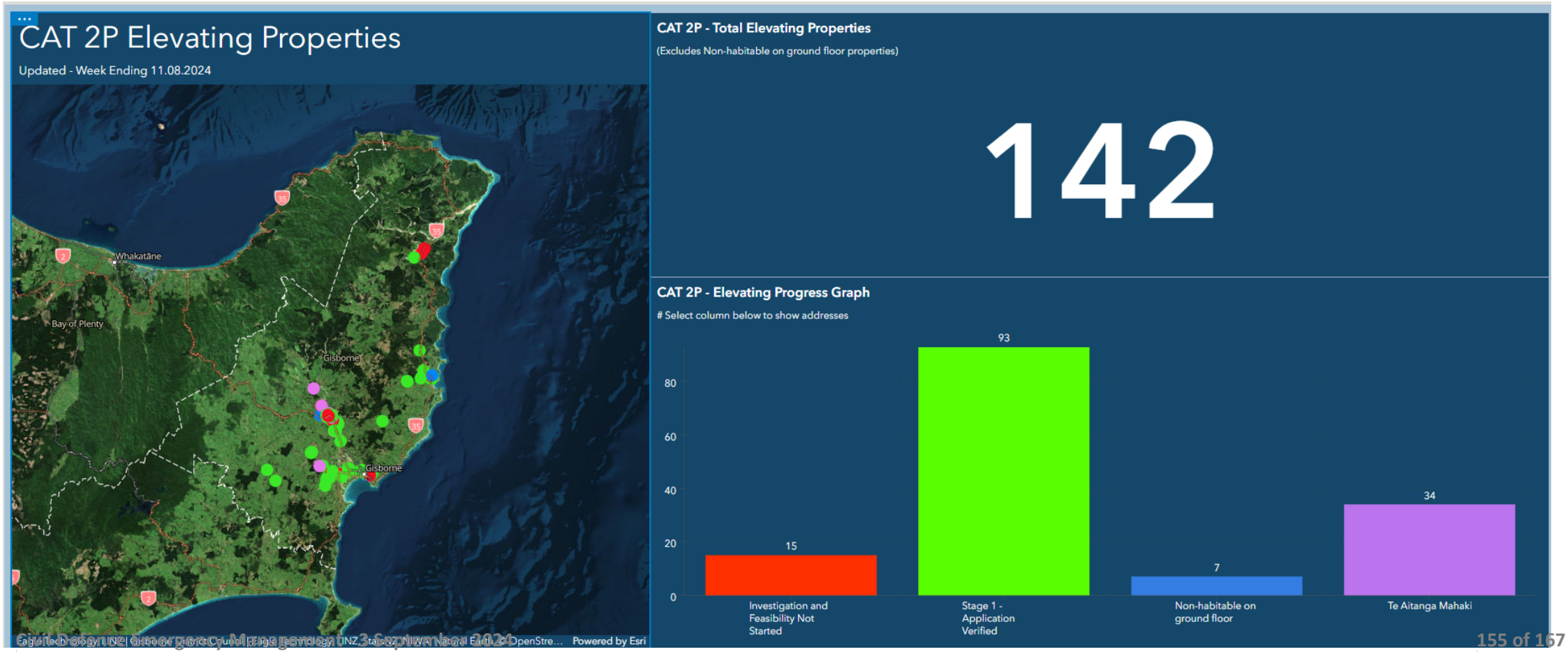
- Funding for eligible commercial entities to support the clean-up of cyclone related sediment and debris.
- 100% of applicants to this fund have now been paid.

GDC categorised 142 properties at 2P

There is funding from CIP to lift up to 143 houses

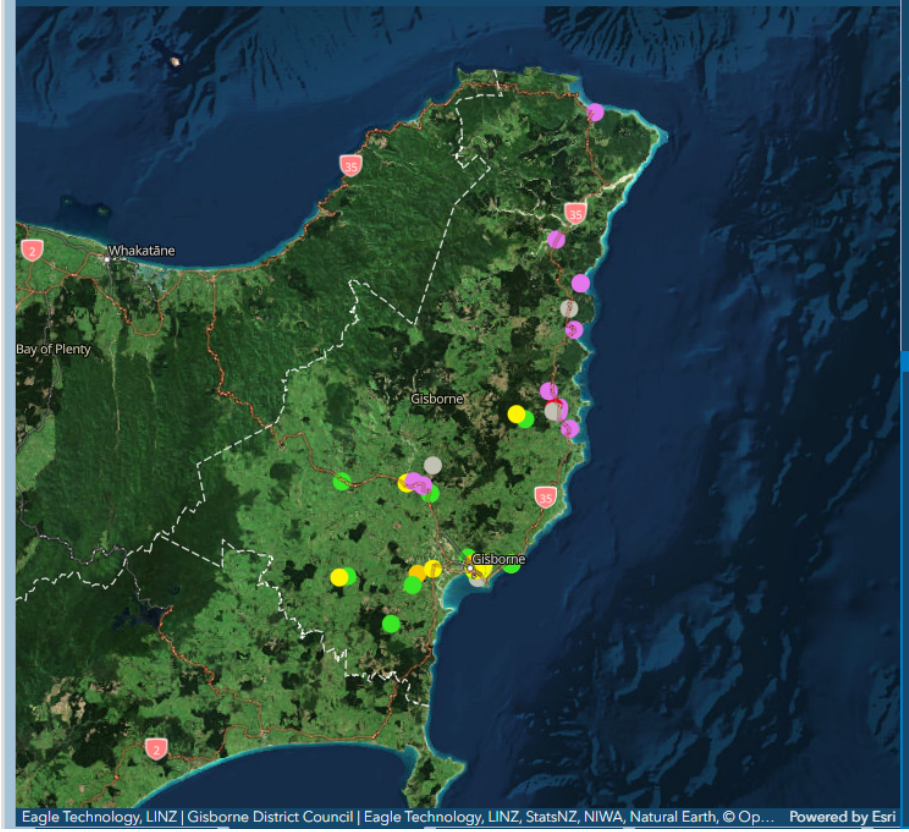
108 will be done by GDC

34 dwellings (33 properties) will be done by Te Aitanga a Māhaki



CAT 3 Buyout Properties

Updated - Week Ending 11.08.2024



CAT 3 - Buyout Satisfaction Survey

Surveys Sent - 22
Surveys Received - 9
Survey Response Rate - 41%

Overall Satisfaction – 100%
(very satisfied or somewhat satisfied)

CAT 3 - Total Buyout Properties

69

CAT 3 - Total Buyout Properties

Excluding Properties on Whenua Maori Pathway

54

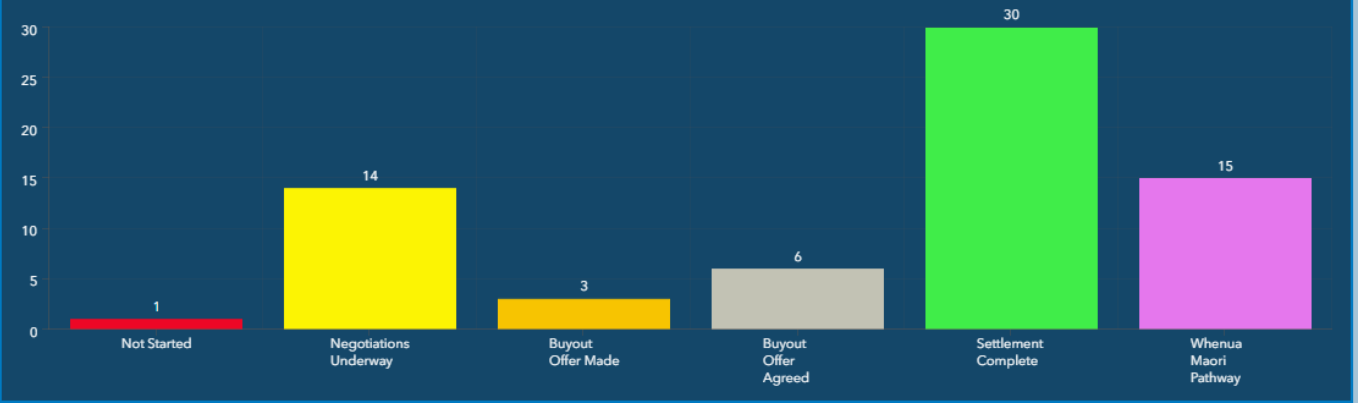
CAT 3 - % of Buyout Properties Completed

Excluding Properties on Whenua Maori Pathway

55.6%

CAT 3 - Buyout Progress Graph

Select column below to show addresses



FOSAL

Risks and Issues

- Valuation challenges resulting in a higher valuation/ buy out and distrust from other property owners
- Community expectations and completion timeframes and concerns on homes not being lifted in time for next weather event.
- Temporary housing for families while their house is being lifted.

Next Steps

- Demolition of houses and residential improvements
- Continue buyout process, 55% of settlements have been completed.
- Drop in hui are scheduled for homeowners to determine whether they would like to self-lift or have a managed lift.

Flood Resilience

As a result of Cyclone Gabrielle and associated severe weather events in 2023, $64 Million of government funding was approved ‘in principle’ for flood resilience in Oct 2023. Funding must be spent within 10years, and in areas linked to the FOSAL Cat 2 properties. Funding split is: 90% CIP / 10% GDC cost share.

Waipaoa Stopbanks

- $21.6M Waipaoa funding application approved in Feb 2024.

Te Karaka Project

- $13.2M Te Karaka funding application was approved in July 2024.

Flood Resilience

- $11M Flood Resilience Investification funding application is awaiting minister approval from Government.

Flood Resilience

Risks and Issues

- Contractor/specialist availability - Low competition at the tender box, high rates, no one suitable to undertake work.
- Staff retention - Loss / change of key team members over the life of the project.
- Under resourcing - Staff do not have sufficient time availability to focus on the project.
- Adverse Weather Conditions - Delays to program of works due to unseasonal weather. Too wet to work.

Next Steps

- Planning, investigation, geotech, and detailed design works is also ongoing for future areas and stages (all on western side of the Waipaoa River). This work includes:
  - Hydraulic modelling around the Wi Pere Trust area to feed into stopbank detailed design.
  - Detailed design for a significant culvert renewal (2.3dia pipe alongside the Whakaahu).
  - Complete detailed design work to upgrade the existing Whatatuna floodgates near Manutuke/Te Arai River.
- Te Karaka Flood Scheme 'Optioneering' assessment work to commence from late June 2024 onwards.
- The hydraulic model for the Taruheru & Waimata catchment has been calibrated.

Community Led Recovery Plans

Description

- Supporting communities across Tairāwhiti to develop Community Led Recovery Plans to capture their priorities and aspirations for recovery from Cyclone Gabrielle at a community level.
- Plans will be shared with Council, Regional Public Service, philanthropic funders and other partners to target support for communities for their recovery

Latest Progress

- 21 Plans shared with Council
- 19 Plans can be shared with regional public service and other partners.

Community Led Recovery Plans

Risks and Issues

- Lack of integration of priorities and aspirations identified within the Plans in Council's work programmes.
- The timeframe for the completion of Plans has been extended at the request of communities. A lack of capacity within communities has impacted their ability to engage with Community Led Recovery Planning

Next Steps

- Planned engagements with CLRP communities who participated in the 3 Year Plan engagement process.
- Continued engagement with communities who previously did not have capacity to participate.

Te Kaunihera o Te Tairāwhiti
GISBORNE
DISTRICT COUNCIL

24-254

Title: **24-254 Welfare Quarterly Report**

Section: Civil Defence Emergency Management

Prepared by: Dallas Haynes - Emergency Management Advisor - Welfare

Meeting Date: Tuesday 3 September 2024

Legal: No	Financial: No	Significance: **Low**

Report to CIVIL DEFENCE EMERGENCY MANAGEMENT GROUP/KAIWHAKAHAERE OHOTATA WHAKAMARU TŪMATANUI for information

PURPOSE - TE TAKE

The purpose of this report is to provide an update on the progress of the Welfare Coordination Group and subfunction clusters in developing structures, plans, and processes for delivering emergency welfare services.

SUMMARY - HE WHAKARĀPOPOTOTANGA

The Welfare Coordination Group (WCG) continues to identify and implement lessons learned from responses to emergency events. The WCG team actively collaborates and works together to focus on solutions and prioritise the well-being of individuals and families.

The decisions or matters in this report are considered to be of **Low** significance in accordance with the Council's Significance and Engagement Policy.

RECOMMENDATIONS - NGĀ TŪTOHUNGA

That the Civil Defence Emergency Management Group/Kaiwhakahaere Ohotata Whakamaru Tūmatanui:

1. **Notes the contents of this report.**

Authorised by:

Nedine Thatcher Swann - Chief Executive

Keywords: Welfare Coordination Group, WCG, Welfare Update, Subfunction Clusters updates, training updates, Taiāwhiti welfare forum, needs assessments

BACKGROUND - HE WHAKAMĀRAMA

1. The most recent Welfare Coordination Group (WCG) meeting, held on 14th August, was well attended. The meeting focused on the progress of sub-function clusters, training updates, and complex needs.

DISCUSSION and OPTIONS - WHAKAWHITINGA KŌRERO me ngā KŌWHIRINGA

June Severe Weather Event – Welfare Response

2. Severe weather on the 25-26 June resulted in a minor welfare response. A total of 6 needs assessments were conducted due to isolation, although not officially declared.

3. Five out of the 6 assessments were conducted as precautionary measures to enable ongoing welfare checks, and only one assessment resulted in the delivery of self-purchased food supplies via helicopter.

4. Two urban community-led centres, the House of Breakthrough and Te Poho o Rawiri, opened their doors to support evacuated whanau. Though the numbers that sought assistance were small, the support was well received.

Wairoa Deployment

5. On 27 June, surge staff were needed to support the welfare function and declaration in Wairoa. Initially, the Tāirawhiti Group Welfare Manager was deployed to assist the local Welfare Manager, but it quickly evolved into a significant overhaul of the needs assessment system.

6. Over a four-day period, additional tasks of a Welfare Manager included training, testing, and managing a new needs assessments process.

7. Photo below shows some staff deployed to support the Wairoa Response.

From left to right: Bruce Rutherford (EMBOP) - Operations Specialist, Rochelle Faimalo (NEMA) - REMA, Paul Broughton (EMBOP) - Operations/Logistics and EMAT, Josh Bougen (EMBOP) - Geospatial Specialist, Dallas Haynes (TEMO) - Group Welfare Manager

Pasifika

8. Over the course of 3 weeks, the Emergency Coordination Centre (ECC) hosted a series of workshops aimed at enhancing preparedness within the Pasifika community. These workshops were attended by almost 100 Pasifika families, providing them with crucial knowledge and skills related to hazard planning and proactive decision-making.

9. Notably, the training sessions also included an additional needs assessment component, fostering further connections and relationships among various welfare groups within the community.

Subfunction (Cluster) Updates

(Summary of reports, highlighting areas of interest)

10. The three CDEM Cluster groups are focused on developing operational plans that are ready for review and approval. To date, the plan for Household Goods and Services has been submitted to Coordinating Executive Group (CEG) for ratification on the 7th of August. We hope to gain approval at the next scheduled CEG meeting later in the year.

11. The Psychosocial Wellbeing team provided support during the recent weather event and have undertaken internal training to support responses.

12. Current challenges include the end of funding for the Mental Health and Addictions Response Manager and Recovery Manager roles in Te Whatu Ora. This raises concerns about how the psychological response will be managed in future events, especially since the tested systems have not been utilised in real events. While we understand that Te Whatu Ora is working on a plan to ensure their roles are available in future events, we need clarity on how future events will be managed in the meantime.

13. TAS (Temporary Accommodation Service) is currently working on resource developments to improve time and processes. It is likely that these developments will also include further resourcing to assist emergency accommodation needs.

14. Financial Assistance - Civil Defence payments were activated for Te Karaka on Thursday 27 June and ended on Thursday 11 July at 6 pm.

15. There was a low uptake, with thirty-six payments made to 24 clients totalling just over $6,700. Some individuals experienced a loss of livelihood, and there were inquiries from people not living in impacted areas.

16. Using the Tairāwhiti Needs Assessment system as part of the Wairoa response significantly improved the coordinated support to those affected. MSD was able to receive referrals for Financial Assistance directly via email.

17. Tairāwhiti Financial Assistance subfunction met and have agreed on conditions for activation and have identified learnings from previous events that we would incorporate into future planning.

18. No reports were received from the following clusters:
    - Inquiry Function (on leave).
    - Care and Protection of Children and Young Persons (on leave).
    - Animal Welfare (on leave)

Tairawhiti Welfare Forum 2024

19. Approximately 50 people from various agencies providing welfare services in Tairāwhiti attended the forum held on May 21st at the ECC (Emergency Coordination Centre).
20. The forum aimed to facilitate better connections between teams, foster relationships, and enhance understanding of each other's roles and responsibilities.
21. Representatives from NEMA, the Group Welfare Manager from Bay of Plenty, and the Emergency Management Advisor - Welfare from Hawkes Bay also participated in the forum.

Needs Assessment Training Update

22. Needs assessment training continues to reach more members of the wider community, to date 31 training sessions have taken place with over 300 attendees.
23. The needs assessment training will be ongoing and available at the ECC including offsite and rural groups. We will consider offering refresher training to keep those who have already attended engaged, but we will review this possibility later in the year.

ASSESSMENT of SIGNIFICANCE - AROTAKENGA o NGĀ HIRANGA

Consideration of consistency with and impact on the Regional Land Transport Plan and its implementation
Overall Process: **Low** Significance
This Report: **Low** Significance

Impacts on Council's delivery of its Financial Strategy and Long Term Plan
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This Report: **Low** Significance

The effects on all or a large part of the Gisborne district
Overall Process: **Low** Significance
This Report: **Low** Significance

The effects on individuals or specific communities
Overall Process: **Low** Significance
This Report: **Low** Significance

The level or history of public interest in the matter or issue
This Report: **Low** Significance

24. The decisions or matters in this report are considered to be of **Low** significance in accordance with Council's Significance and Engagement Policy.

TANGATA WHENUA/MĀORI ENGAGEMENT - TŪTAKITANGA TANGATA WHENUA

25. Iwi and Hapu continue to be embedded in the WCG across the responsible agency group and support agencies, allowing better collaboration on decisions and the effectiveness of planning. The roll-out of needs assessment training to community groups has further enhanced iwi engagement.

COMMUNITY ENGAGEMENT - TŪTAKITANGA HAPORI

26. Community engagement for this group grows through the needs assessment training and the establishment of the subfunction clusters. Networking across the teams has naturally cascaded into communities with the bonus of identifying training opportunities for individuals that may not have previously been known or available. The Welfare space at the ECC is often filled with community groups, eager to understand how they can help.