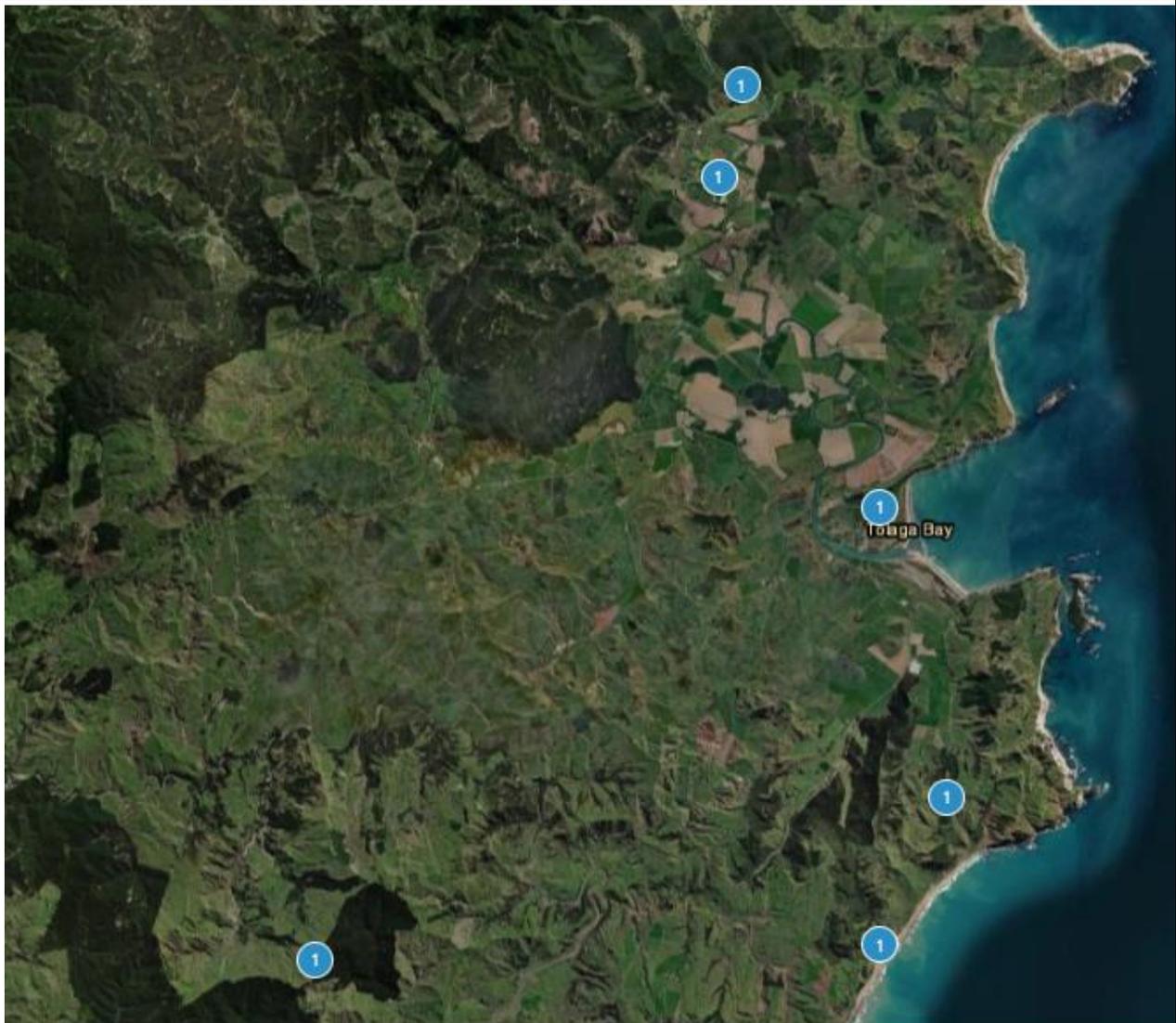


## CDEM Resilience Fund project application form

*This form provides the minimum of information for the application; a detailed project plan should be developed to inform this application and may be attached.*

<b>Project title</b>	
Project title	<u>Improving Resilience from Rain Events</u> Understanding the impact of high intensity storms on property in Tairāwhiti and an analysis of changes to risk and resilience resulting from climate change
<b>Date of application</b>	
Date of application	31 <sup>st</sup> January 2022
<b>Details on application</b>	
<b>Applicant</b> <i>(Note: CDEM Group must endorse/sponsor all applications)</i>	
Applicant <i>(Note: CDEM Group must endorse/sponsor all applications)</i>	Gisborne District Council/Tairāwhiti CDEM group/NIWA
<b>Sponsoring CDEM Group</b>	
Sponsoring CDEM Group	Tairāwhiti CDEM Group
<b>Other local authorities, Groups or organisations supporting this proposal</b>	
Other local authorities, Groups or organisations supporting this proposal	N/A
<b>Project description</b>	
<p><b>Executive summary</b> <i>[200 words maximum description]</i></p> <p>Tairāwhiti is one of New Zealand’s regions most vulnerable to hazards. This is exacerbated by a low ratepayer base, and small, largely coastal settlements outside of Gisborne. The impacts of 2017 Cyclone Cook and 2018 Queens Birthday storms highlighted the need to focus on high frequency, high impact events that affect the community and their hard-won assets.</p> <p>The impact of these storms is well known. Cyclone Bola was felt acutely in Tairāwhiti resulting in a programme of converting land to permanent forest cover to protect it from weather-induced instability. These forests have since been converted to harvest forests and this has exacerbated the effects of high intensity storms on communities when harvested. The impacts have included flooding of dwellings, loss of residential land due to slipping and isolation of vulnerable communities due to failure of infrastructure.</p> <p>Compounding the impacts are the timeliness of weather warnings. For example, a severe weather warning was not received for the 2018 Queen’s Birthday storm leaving local communities unprepared. Thus, Gisborne District Council seeks to improve community resilience and mitigate the risks from such events to our communities through developing a bespoke system that better integrates the NIWA HIRDS model with Council’s rain and flood gauge dataset. This will allow for the existing flood models to be more accurate and improve councils capacity to better anticipate the scale of events and thus improve preparedness.</p>	
<p><b>Challenge/opportunity</b> <i>[200 words maximum description]</i></p> <p>The principal tool for assessing rainfall return periods and intensity nationally is <b>NIWA’s</b> High Intensity Rainfall Design System (HIRDS). It is designed to estimate high intensity rainfall at any location for a range of return periods and durations. While widely used, it can be inconsistent with gauge observations, especially for post-event analysis. For example, the 2018 Queens Birthday storm showed the difficulty in linking modelled probabilistic return periods with real-world events and their impacts on communities. The results from one site may not reflect overall storm intensity, and localised cells embedded within high intensity storms may have a huge impact on local communities. The system is based on a set of rain gauges which are widely dispersed (Figure One) and do not include key rain gauge sites from the GDC network. Adding some of these rain gauges will improve the resolution of the system thus enhancing post-event analysis.</p> <p>The project will use a new method of estimating return periods, where the shape of the extreme value distribution is constrained to be regionally consistent rather than derived on a per-gauge basis. This will provide better modelling of storm events under a suite of weather systems, such as ex-tropical cyclones and extreme southerlies that have caused significant infrastructural damage to the region. The resulting system will provide more spatially informative and up-to-date storm intensities under different future climate scenarios. This will be of great benefit to disaster preparedness and when developing resilient infrastructure.</p>	



**Figure One. Screenshot of the HIRDS sites in the Uawa Catchment. As this shows there is a large part of the catchment not covered. A Council rain gauge is located in the middle of the area on no coverage (Mangaheia at Willowbank) and including this in the database will allow for greatly enhanced coverage over this vulnerable catchment.**

Alignment with priorities and objectives of the National Disaster Resilience Strategy (NDRS) *[200 words maximum description]*

Managing Risks: Experience has shown that it is currently difficult to assess the hazard potential of an approaching storm with the tools at hand. GDC has a flood hazard system which uses the current HIRDS model to anticipate potential flood levels from an event. We have found that HIRDS, although an excellent tool, needs to be more accurate at a regional level and better take orographic anomalies into account.

The tool will allow for more timely and more accurate information to be disseminated to the CDEM community link teams and thus improve responsiveness and resilience at a township level.

Alignment with Principles and Allocation Preferences *[200 words maximum description]*

The research is well aligned with the NDRS. The project is likely to lead to a refinement of the HIRDS system and is thus expected to have national benefits, particularly as many regions do not have enough rain gauge and flood flow recorders to allow for real-time monitoring tools in all catchments. It is expected that the research will allow for a greater understanding of the topographic anomalies that can cause storm damage to infrastructure and private property as well as imperil lives. The storm that occurred in the second week in June 2018 (following the Queens’ Birthday storm) is a good example of such an anomaly, as it caused significant flooding resulting in damage to properties and significant environmental impacts but did not trigger any rain gauge alerts.

Our recent climate change study also signalled that rare extreme rainfall events and more frequent storm events will both increase in severity under all climate change scenarios. As a consequence, Council needs a robust system to assess the potential future impacts of rare extreme events (and how these may change in duration and intensity under expected climate change), as well as more frequent but still damaging storm events. The project will be useful in assessing future rainfall and flood risk in ungauged catchments.

Experience has shown that the impacts of extreme weather events more significantly impact on rural communities, most recently Tolaga. Tairāwhiti's rural areas are dominated by Māori (cf. Tolaga 86%, Ruatoria 95%) and these communities will obtain the greatest benefits from the project.

The project would result in an enhanced flood hazard model for the Gisborne region.

Nationally, the methodology could then be applied to improve the flood models used by other regions allowing resources to be better allocated as there will be potential greater certainty in identifying and responding to rainfall hotspots

**Application of outcomes/benefits to sector** *[200 words maximum description]*

The results of this project will be used by Council to enhance its storm and flood risk modelling and by presentations to the community via reports to Council and to the regional CDEM network. As it is expected that the research will have national benefits, it will be shared with Regional Councils nationally via the Regional Councils Hazards Response and Management Special Interest Group.

**Ongoing costs (post project) and how it will be funded** *[Please provide a summary of ongoing costs (if any) and how it will be funded/managed - 200 words maximum]*

The project will result in an upgraded council flood model which is funded on an ongoing business as usual basis. The results will help inform the review of the Tairāwhiti Regional Management plan

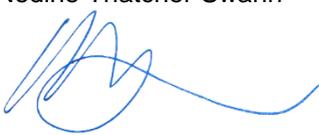
**Project design**

Project manager	Dr Murry Cave, GDC Principal Scientist
Other project members	Janic Slupski, Senior Policy Advisor Gisborne District Council (Application of public policy to Hazard management) Bridget Bosworth (Senior hydrologist), Gisborne District Council
External providers/contractors	Dr Trevor Carey-Smith, Climate Scientist, National Institute of Water and Atmosphere Research
NEMA Resource (if required)	

**Deliverables** *[Note: payments will be made after successful completion of milestones identified]*

Key Milestones	Date for completion	Cost (Invoice Amount) <sup>1</sup>
Detailed scoping workshop between GDC and NIWA to establish final design and data requirements for project. Report to Governance committee	Within 2 months of project approval	\$10,000 <b>(\$5000)</b>
Mid project workshop to identify issues, validation assumptions and obtain stakeholder feedback Final report to Governance committee	Within 7 months of project approval	\$50,000 <b>(\$10,000)</b>
Emerged training for GDC staff into HIRDS modelling generally and GDC Model	Within 10 months of project approval	\$ 20,000 <b>(\$10,000)</b>

<sup>1</sup> Council costs in (Red Brackets)

Preparation of and submission of final products and project report. Final report to Governance committee	Within 12 Months of project approval	\$25,000 <b>(\$5,000)</b>
<b>Identified risks</b>		
Risks	Suggested mitigation / management	
Staff changes at Council	Build in redundancy with more than one staff member with a good understanding of the project and outcomes.	
Staff changes at NIWA	Build in redundancy with more than one staff member in NIWA with a good understanding of the project and outcomes.	
Delay in project completion due to events outside of Council or NIWA control of a Covid 19 outbreak	Liaise with NEMA regarding amended milestone timeframes	
Project not complete within 12 months of project approval	NIWA to advise GDC and NEMA as soon as the time overrun becomes apparent so that milestones can be amended.	
<b>Funding request and use</b>		
CDEM Resilience Fund contribution	\$105,000	
Local authority/organisation contribution	\$30,000 (primarily in kind)	
Other sources of funding or support		
Budget <i>[Please supply spreadsheet]</i>	\$135,000	
Applies if application exceeds \$100,000 over the life of the project	Are you prepared to attend an interview in support of this application (if needed)?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
<b>Application confirmation</b>		
Is this application from an individual or other organisation (not CDEM Group)? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>		
Does the CDEM Group support this application? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> <i>(Sign-off below confirms support)</i>		
Approval of Chief Executive <i>(Chief Executive or Head of the organisation receiving the funding)</i>	Nedine Thatcher Swann 	
Approval of CEG Chair	Nedine Thatcher Swann 	
<i>All communications regarding the application, including approval decisions will be addressed to the Chief Executive and CEG Chair</i>		
<b>CDEM Group comment</b>		

**Note: Only complete forms will be considered for assessment. All completed forms and supporting documents must be emailed to NEMA on Resilience.Fund@nema.govt.nz**

<b>NEMA Assessment (Internal Use Only)</b>		
<b>Principles</b>	<b>Yes</b>	<b>No</b>
Local/Regional Focus	<input type="checkbox"/>	<input type="checkbox"/>
Valuing the role of Maori in Emergency Management System	<input type="checkbox"/>	<input type="checkbox"/>
NEMA involvement required	<input type="checkbox"/>	<input type="checkbox"/>
<b>Allocation Preferences</b>		
Alignment with NDRS	<input type="checkbox"/>	<input type="checkbox"/>
Achieving equity of outcomes for Māori communities, marae, hapū, iwi, and Māori organisations.	<input type="checkbox"/>	<input type="checkbox"/>
Outcome focused	<input type="checkbox"/>	<input type="checkbox"/>
Applicable in other regions/CDEM Groups	<input type="checkbox"/>	<input type="checkbox"/>
Enables national consistency	<input type="checkbox"/>	<input type="checkbox"/>
Wider funding/resource commitment (i.e. co-funding, on-going funding, resource time committed)	<input type="checkbox"/>	<input type="checkbox"/>
Builds on existing work	<input type="checkbox"/>	<input type="checkbox"/>
Operational expenditure (Opex)	<input type="checkbox"/>	<input type="checkbox"/>
Capital expenditure (Capex)	<input type="checkbox"/>	<input type="checkbox"/>
<b>Other</b>		
Application from individuals or other organisations endorsed/sponsored by CDEM Group	<input type="checkbox"/>	<input type="checkbox"/>
<b>NEMA Subject Matter Expert Comment</b> Supported <input type="checkbox"/> Not supported <input type="checkbox"/>		
<b>NEMA Regional Emergency management Advisor Comment</b> Supported <input type="checkbox"/> Not supported <input type="checkbox"/>		
<b>NEMA Review Panel Comment</b> Supported <input type="checkbox"/> Not supported <input type="checkbox"/>		
<b>NEMA Director Decision Sign-off</b> Approved <input type="checkbox"/> Declined <input type="checkbox"/>		
<hr/> <b>Director of Civil Defence Emergency Management</b>		