Resilience Fund Application Form

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

Project title	Milford Sound/Piopiotahi Tsunami, Landslide and Inundation Modelling
Date of application	29 January 2024
Details on application	
Applicant	Emergency Management Southland (EMS)
Sponsoring CDEM Group	Emergency Management Southland (EMS)
Other local authorities, Groups or organisations supporting this proposal	Southland District Council, Invercargill City Council, Gore District Council, Environment Southland, Te Ao Mārama, Milford Sound Tourism Limited, Milford Sound Community, Department of Conservation, Te Rūnanga o Ngāi Tahu
Project description	
Executive summary *[200 words maximum]*	
Recently published research has highlighted the potential impacts of tsunami in Milford Sound/Piopiotahi (Harris, 2024)[1]. This has both reinforced previous research and local assumptions of the hazard and raised wider awareness of Milford's tsunami risk. However, more work is needed to enhance our collective understanding of this risk and enable informed actions in mitigation and readiness. This project will quantify the risk of tsunami hazards to visitors, workers and the community in Milford Sound/Piopiotahi, which is both a 'jewel in New Zealand's tourism crown' and an area with a complex hazard profile. Located at the Southern end of the Alpine Fault, there is a significant risk of tsunami generated by both earthquakes and landslides. This project has been scoped by GNS Science (proposal attached) with Stages 1 and Stages 2 being the focus of this application. This project will use state-of-the-art hydrodynamic tsunami modelling, high-resolution bathymetry, and exposure assessments, and work with stakeholders to provide a comprehensive understanding of the tsunami risk in Milford Sound/Piopiotahi. Project stakeholders include EMS, AF8 Programme (AF8), Department of Conservation (DOC), and Milford Sound Tourism Limited (MSTL). This group has already initiated co-funding arrangements to progress work by engaging GNS Science in the development of hazard and mitigation communications advice. Partnerships with mana whenua and the Milford	

[1] Harris, O. L., Robinson, T. R., & Wilson, T. M. (2024). Agent-based modelling of evacuation scenarios for a landslide-generated tsunami in Milford Sound, New Zealand,
International Journal of Disaster Risk Reduction, 113(1), 1-11

Sound/Piopiotahi community will ensure that traditional and local knowledge of the environment contributes to understanding and managing risks.

By addressing uncertainties in current risk assessments, this project will enable better-informed decisions regarding risk management and mitigation. This will lead to future work to consider both individual and societal risk, with a particular focus on understanding the unique vulnerabilities of the area and the challenges in evacuation during potential tsunami, landslide, and inundation events.

Challenge/opportunity *[200 words maximum]*

Milford Sound/Piopiotahi faces significant natural hazards due to its location on a highly active plate boundary, notably the Alpine Fault which crosses the entrance of the Sound and has a 75% chance of generating a large earthquake in the next 50 years. An Alpine Fault earthquake will likely generate tsunami and inundation in the Sound, through displacement of the sea floor and/or landslide/rockfall into the Sound. Despite the recognition of this risk, existing tsunami hazard models are based on generalised assumptions that do not account for the region's unique topography and bathymetry. Current risk assessments for Milford Sound/Piopiotahi underestimate the complexity of potential tsunami inundation, and with growing visitor numbers (up to 6,000+ daily) the risk posed is particularly concerning for both tourists and workers in the region.

This project presents an opportunity to address these gaps using state-of-the-art tsunami modelling, informed by high-resolution data, local knowledge and mātauranga Māori, leading to more accurate risk assessments. This will enable targeted mitigation strategies and readiness actions to improve the local, regional and national resilience, ensuring the safety of those in Milford Sound/Piopiotahi and enhancing emergency response planning. There is also an opportunity to contribute to broader issues of landslide generated tsunami and seiche waves in enclosed water bodies, such as lakes, elsewhere in Aotearoa..

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

This project directly aligns with the NDRS goals of managing risks, responding effectively to emergencies, and enabling community resilience.

Managing Risk:

- **Objective 1:** "Identify and understand risk scenarios (including the components of hazard, exposure, vulnerability, and capacity), and use this knowledge to inform decision-making."

- **Objective 4:** "Address gaps in risk reduction policy (particularly in the light of climate change adaptation)."
- **Objective 5:** "Ensure development and investment practices, particularly in the built and natural environments, are risk-aware, taking care not to create any unnecessary or unacceptable new risks."

Responding Effectively to Emergencies:

- **Objective 9**: "Strengthen the national leadership of the emergency management system to provide clearer direction and more consistent response to and recovery from emergencies."
- **Objective 12**: "Improve the information and intelligence system that supports decision-making in emergencies to enable informed, timely, and consistent decisions by stakeholders and the public."

Enabling Community Resilience

- **Objective 13**: "Enable and empower individuals, households, organizations, and businesses to build their resilience, paying particular attention to those people and groups who may be disproportionately affected by disasters."
- **Objective 14**: "Cultivate an environment for social connectedness which promotes a culture of mutual help; embed a collective impact approach to building community resilience."

By leveraging advanced tsunami modelling and high-resolution data, the project addresses the NDRS objective to identify and understand risk scenarios, including hazards, exposure, and vulnerability. It supports the development of risk-aware decision-making for stakeholders and enhances risk literacy within the Milford Sound/Piopiotahi community and the broader region.

Additionally, the project emphasises reducing disaster risk by applying advanced modelling techniques to refine evacuation plans and mitigation strategies.

It contributes to the NDRS priority of protecting critical infrastructure and ensuring the safety of people by providing evidence-based recommendations for disaster preparedness and response. This work aligns with the principle of empowering local communities and organizations to act, supporting stronger partnerships among stakeholders such as EMS, DOC, MSTL, and the local community. By addressing unique geographic vulnerabilities, the project reflects the holistic, inclusive, and resilience-focused approach outlined in the NDRS, ultimately contributing to the safety, well-being, and prosperity of Milford Sound/Piopiotahi, it's occupants and its visitors.

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

This project aligns with principles of evidence-based decision-making, collaborative partnerships, and equity, as emphasised in national disaster resilience and funding allocation preferences. The use of state-of-the-art tsunami modelling with, local knowledge, mātauranga Māori and high-resolution LiDAR data ensures a scientifically comprehensive, collective and culturally inclusive foundation for assessing risk. This evidence-based approach will support better decision-making across agencies involved in Milford Sound/Piopiotahi's risk management.

The collaborative structure of the project involves key stakeholders, including local emergency management, national agencies, and the tourism industry. This aligns with the allocation preference for projects that demonstrate multi-stakeholder engagement and cross-sectoral coordination. Furthermore, the project prioritises equity by addressing the safety needs of diverse populations, including workers and visitors (domestic and international), ensuring that

risk mitigation strategies are inclusive and account for Milford Sound/Piopiotahi's unique challenges in evacuation and infrastructure.

By focusing on actionable outcomes—such as refining evacuation plans and identifying effective mitigation measures—the project supports resource efficiency and long-term sustainability, aligning with funding preferences for initiatives that maximize benefits while minimizing ongoing costs. Ultimately, this project exemplifies principles of resilience-building, innovation, and community safety, addressing both immediate and systemic vulnerabilities in Milford Sound/Piopiotahi.

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

The outcomes of this project will directly enhance disaster resilience and risk management capabilities in the tourism, emergency management, and environmental sectors. The detailed tsunami modelling will enable better risk assessment and will provide critical data to support evacuation planning, emergency response protocols, and long-term infrastructure development in Milford Sound/Piopiotahi.

This project will use state-of-the-art tsunami modelling that has never been applied before in New Zealand, setting a new standard for disaster risk assessment and management. By integrating high-resolution bathymetric and topographic data with advanced hydrodynamic modelling techniques, the project will generate comprehensive modelling for Milford Sound/Piopiotahi. This cutting-edge approach goes beyond traditional methods, offering a transformative way to understand tsunami hazards in complex, fjord-like environments.

The methodologies and tools developed through this project will not only benefit Piopiotahi Milford Sound/Piopiotahi but also provide a blueprint for future modelling of other high-risk areas in New Zealand, such as the Marlborough Sounds, Banks Peninsula, and the Bay of Islands. These regions share similar geographic and topographic complexities, and the outcomes of this project will support risk assessments and mitigation strategies across these locations, fostering nationwide resilience.

Partnership with mana whenua ensures that traditional knowledge enhances the understanding of the environment and hazard risks and supports culturally sensitive mitigation strategies.

For the tourism sector, the insights will enhance safety protocols, ensuring consistent messaging and continued visitor confidence. Emergency management will gain tools for more effective evacuation planning and response coordination. The environmental sector will gain a better understanding of the region's natural hazard dynamics, facilitating future research and sustainable development practices.

By addressing vulnerabilities and uncertainties, the project delivers sector-wide benefits that enhance overall resilience, align with national safety objectives, and set a precedent for collaborative, data-driven disaster risk reduction initiatives

Ongoing costs (post-project) and how it will be funded *[200 words maximum]*

This application is to provide funding for Stage 1 and Stage 2 (see GNS Proposal attached). A further 6 stages will require funding that can be sources by stakeholders, funding agencies and science partners.

The ongoing costs post-project primarily involve the maintenance, updating, and application of the tsunami and inundation modelling tools developed during the project. This includes periodic updates to reflect new data, such as updated seismic activity records, landslide probability studies, or changes in infrastructure and visitor patterns in Milford Sound/Piopiotahi.

Additionally, there will be costs associated with continued stakeholder engagement, training for emergency management teams, and public awareness campaigns to ensure the community remains informed and prepared.

To fund these ongoing activities, a combination of approaches will be employed. EMS, councils and DOC, will contribute through their respective budgets and funding streams for disaster resilience and risk management. Tourism operators and local businesses benefiting from the improved safety infrastructure may also participate in cost-sharing or through targeted levies.

Further funding opportunities will be sought through national resilience grants and partnerships with academic institutions, which can integrate these models into broader research initiatives. By embedding these costs into regular operational budgets and leveraging external funding sources, the ongoing use and refinement of the tools will ensure long-term benefits without imposing excessive financial burdens on any single entity.

Project design		
Project manager	Aly Curd – EMS Manager	
Other project members	Haylee Preston – MSTL, Andy Roberts – DOC, Jamie Ruwhiu - TroNT, Angie Hopkinson – Te Ao Mārama	
External providers/contractors	GNS Science	
NEMA resource (if needed)	SME support and advice	
Deliverables *[Note: payments will be made after successful completion of milestones identified]*		
Key milestones	Date for completion	Cost (invoice amount)
Please see GNS Piopiotahi Milford Sound/Piopiotahi Tsunami Risk Assessment proposal FOR Stage 1 &Stage 2		$700,000
Identified risks		
Risks	Suggested mitigation / management	
Data gaps and inaccuracies	The project relies on high-resolution bathymetric and topographic data. If this data is incomplete or inaccurate,	

	it could affect the reliability of the tsunami modelling. There will be validation of existing data using independent sources and conduct supplementary surveys where needed. We will engage with experts to ensure data quality and consistency.		
Uncertainties in tsunami sourcing scenarios	Variability in potential earthquake magnitudes, landslide characteristics, and fault behaviours may lead to modelling uncertainties. A range of credible scenarios will be used to test sensitivity and refine probabilistic hazard models. Clearly communicate the assumptions and limitations to stakeholders.		
Funding constraints for implementation	Limited resources may hinder the adoption of recommended mitigation strategies. A phased implementation plan will be developed, and we will pursue additional funding through national grants, research grants, public-private partnerships, and local contributions.		
Funding request and use			
CDEM Resilience Fund contribution	$700,000		
Local authority / organisation contribution	$20,000 – this has covered Stage 0 of this project to date		
Other sources of funding or support	$20,000 – this has covered Stage 0 of this work to date		
Budget *[please supply spreadsheet]*	Please see attached GNS Piopiotahi Milford Sound Tsunami Risk Assessment proposal FOR Stage 1 &Stage 2		
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 ☒	No ☐
Application confirmation			
Is this application from an individual or other organisation		Yes ☐	No ☒
Does the CDEM Group support this application? *[sign off below confirms support]*		Yes ☒	No ☐
Approval of Chief Executive [Chief Executive or Head of the organisation receiving the funding]	 Name: Wilma Falconer, Chief Executive, Environment Southland		

Approval of CEG Chair	
	Name: Cameron McIntosh, Southland CEG Chair

All communications regarding the application, including approval decisions will be addressed to the Group Manager and CEG Chair

Group Manager: Aly Curd Aly.curd@cdsouthland.nz

CEG Chair: Cameron McIntosh Cameron.McIntosh@southlanddc.govt.nz

CDEM Group comment

Note: Only complete forms will be considered for assessment. All completed forms and supporting documents must be emailed to NEMA at resilience.fund@nema.govt.nz

NEMA Assessment [internal use only]		
Principles	**Yes**	**No**
Local / regional focus	☐	☐
Values the role of Māori in the Emergency Management System	☐	☐
NEMA involvement required	☐	☐
Allocation Preferences		
Alignment with NDRS	☐	☐
Achieves equity of outcomes for Māori communities, marae, hapū, iwi and Māori organisations	☐	☐
Outcome focused	☐	☐
Applicable in other regions / CDEM Groups	☐	☐
Supports national consistency	☐	☐
Wider funding / resource commitment	☐	☐
Build on existing work	☐	☐

Operational expenditure (Opex)	☐	☐
Capital expenditure (Capex)	☐	☐
Other		
Application from individuals or other organisations endorsed/sponsored by CDEM Group		

NEMA Subject Matter Expert Comment	Supported ☐	Not supported ☐

NEMA Regional Emergency Management Advisor Comment	Supported ☐	Not supported ☐

NEMA Review Panel Comment	Supported ☐	Not supported ☐

NEMA Director Decision Sign-off	Approved ☐	Declined ☐
Director of Civil Defence Emergency Management		

Appendix A Report Template

CDEM Resilience Fund Project Status Report			Date: DD MMMM YY	
Project title			Project number	
Project manager		Contact details		
Executive summary of status				
Progress of deliverables				
Milestones	Status (on track, delayed, etc.)	Progress this quarter and next steps		

Identification of any issues (actual or potential)		
	Issue	Mitigation
Schedule		
Staff resources		
Budget		
Dependencies		
Stakeholders		
Quality		
Other		

Budget					
Activity	Expenditure to date	Budget to date	Full year budget	Budget forecast	Variance

Comment on variance

Confirmation		
I confirm the status report is accurately reflected and the invoice amount is correct.		
Project Manager	**Chief Executive**	**CEG Chair**

Comment by Resilience Fund Coordinator