



HAWKE'S BAY REGIONAL COUNCIL

Environmental Resilience Plan

CYCLONE GABRIELLE 2023

*Supporting
our region's
environmental
recovery*



HAWKES BAY
REGIONAL COUNCIL

TE KAUNIHERA Ā-ROHE O TE MATAU-A-MĀUI

Hawke's Bay Regional Council

Environmental Resilience Plan (Edition 1)

Hawke's Bay Regional Council

28 April 2023

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Section 1: Foreword/ He mihi

The effects of Cyclone Gabrielle will be felt, in varying degrees, by the people of Hawke's Bay for many years to come. There are those who have experienced the loss of loved ones, a grief felt by our whole community. Those who are facing the loss of what in many cases equates to a lifetime's work will need the continued support of whānau, friends and community to re-establish livelihoods. The financial cost of infrastructure replacement, borne by us all, will be significant and the workload huge.

As a region we are experiencing the sole positive that comes from calamitous events like this - the rebuilding and strengthening of the community spirit that brings about the stories of incredible kindness and generosity shown by our people towards their community. These stories will pass into history and I'm sure will become a source of pride to Hawke's Bay.

We must also become proud of the decisions we make today that not only put our region on a firm footing for recovery and rebuild, but also ensure our sustainability well into the future. A future that will provide for the next generation. We will certainly be challenged in this process - we are already seeing that policy and practice that has served us well in the past may no longer be fit for purpose. We must identify our collective vision for our region and having achieved that, forge the path that turns that vision into reality.

The most important asset left to us is our people and it is only through the collaboration of our whole community that we will achieve our aims. Everyone wants a thriving community existing sustainably and in harmony with its environment, and with hard work from everybody, now is our best chance to obtain it.

This document is our first edition of a comprehensive plan about how we as a Regional Council will work with the community to restore the environment following Cyclone Gabrielle. It will set a direction for the organisation on the journey to recovery, pulling on all our levers across policy, science, compliance, land management, biosecurity and biodiversity.

The second edition, due in September, will go into more depth about our plan for recovery, following discussions with the community and further analysis. We will work with our community and treaty partners in the development of this plan for the long-term recovery of our region.

The road before us is long and can seem daunting, but by putting one foot in front of another, we will get through this with vision and collaboration, and we will recover.



Hinewai Ormsby

Hawke's Bay
Regional Council
Chair



Sophie Siers

Hawke's Bay
Regional Council
Recovery
Committee Chair



Louise McPhail

Hawke's Bay
Regional Council
Recovery Manager

Section 2: Summary – Impact of the Event on Hawke’s Bay Region

Hawke’s Bay Regional Council (HBRC) rainfall figures show that Cyclone Gabrielle was one of the most significant weather events to impact the region on record. The cyclone delivered staggering amounts of rain over a relatively short period of time, and data indicates this was the largest rainfall event at a number of sites ever recorded in the region.

The impacts of Cyclone Gabrielle have been significant and widespread, and they will be felt across our region and communities for a long time to come. The amount of rainfall coming through the region’s rivers was much larger than the river management system was designed and constructed for, subsequently this has left Hawke’s Bay with some long-term effects.

Cyclone Gabrielle caused significant damage to essential infrastructure, stopbanks, marae, homes, and businesses. The consequence of silt deposition, habitat loss, discharges of contaminants and wastewater to our land, freshwater, and ocean has had a significant impact on our natural environment, biodiversity and ecosystems. The full impact of the flood flows and sediment on freshwater and marine ecosystems is yet to be fully understood and quantified.



Marae, papakainga, urupa, and wāhi tapu sites were significantly affected by Cyclone Gabrielle. The total damage is still yet to be fully understood but it is known that nine Marae have been drastically affected. It is anticipated that more detail of these impacts will be provided in the Locality Plans for each area.

Multiple farms, orchards, vineyards, rural businesses, and homes across the entire region have been damaged by flood waters and inundated with silt and wood debris. Rural and semi-rural areas have been the most affected. While large areas are impacted, the severity of the impact is variable, with silt in some places being up to 2 or 3 meters high, and in others, only light deposits cover the ground.

The power of the flood waters, from where they breached the stopbanks, tore through orchard, viticultural and horticultural properties, leaving in its wake piles of debris consisting of mixed orchard waste and debris carried from other areas by the flood waters.

Hill country erosion has caused significant farming business disruption with severe impact on business operations due to loss of fences, access, and farming infrastructure.

There is a wide range in impact and recovery needs, however, every rural business will have been impacted either directly, or through association by market access, product supply or business interruption.

Dairy farming businesses were severely affected with around a third of Hawke's Bay dairy farms having to dry off their herds due to the inability of Fonterra to collect milk. A number of other dairy farms have been impacted through the loss of pastoral grazing land, and supplementary feed reserves.

Tonnes of household waste from flood damaged properties has also had a considerable impact on the region's landfills. Already under pressure prior to the cyclone event, the landfills will need to be assessed for more capacity or alternative sites found to meet future needs.

Section 3: The Environmental Resilience Plan

3.1 What is an Environmental Resilience Plan?

At the core of the recovery facing the Hawke's Bay is the concept of *'building back better, safer, and smarter'*. This is motivated by the desire to see the environment and communities recover in a way that makes them stronger and more resilient following an event like Cyclone Gabrielle. This provides for a more sustainable and efficient recovery.

The purpose of this Environmental Resilience Plan (the 'Plan') is to provide a clear direction and pathway towards providing for the recovery with a primary focus on the environmental resilience pou and how it underpins all of the pou, as per the Regional Council's roles and responsibilities under legislation. The Plan will achieve this by outlining objectives and goals, identifying key components of the recovery process, establishing key action areas, and timeframes, as well as providing a tool for monitoring and reviewing.

The intent of this plan is to inform:

- Hawke's Bay Regional Council's recovery and resilience planning
- decision-making by the Regional Recovery Agency
- a Regional Recovery Communication and Engagement Strategy

- regional funding needs.

It is important to note that due to the scale of this event the full extent of damage to our communities, environment, infrastructure, and services has not been fully realised. This Plan is based on what we do know, but we acknowledge a thorough impact assessment across the region is needed, but this will take time.

The Environmental Resilience Plan, whilst focused on the immediate recovery needs of the region will provide an important information platform for future plan development. This event and the information required to respond to it has resulted in the significant efforts in scientific research, GIS mapping, modelling and multiple other layers of information. For instance, flood hazard mapping information has been developed to inform Central Government discussions and decisions for Managed Retreat. These spatial layers will provide an important foundation for regional spatial planning which will sit alongside other hazard and planning layers to inform where development may be appropriate in the future.

Whilst the impact of the cyclone on the freshwater and coastal environment is not yet fully understood, this will necessitate the need to establish new environmental baselines. Support for ongoing and more frequent monitoring will inform policy development for the management of these natural resources, including indigenous ecosystems and biodiversity.

The following diagram serves to demonstrate that while recovery may be a lengthy process, building resilience requires proactive decision-making and action to prepare and protect our environment from the effects of climate change in the future.



Vision

Building back better, safer and smarter



Pou



Objectives



3.2 Guiding Principles of the Environmental Resilience Plan

Where recovery investment is being considered under each pou, the HBRC will adopt a collaborative and forward-looking approach according to the following principles for recovering our region. Noting that this aligns strongly with our Strategic Plan Vision of wanting ‘a healthy environment and a resilient and prosperous community’.

This Environmental Resilience Plan reflects our values in the Hawke’s Bay, which are unique and make us who we are. There are five underpinning principles that will guide our resilience pathway.

Principle 1 – Improving our environment

All recovery projects consider opportunities to improve health and resilience of the environment and communities.

Principle 2 – Enabling people to contribute to a sustainable future

Working together in the spirit of kotahitanga to meet economic, social, cultural and health needs in a way that enables everyone to contribute equitably to a resilient and healthy environment.

Principle 3 – Environmentally friendly and climate resilient investment and development

Investment that supports and encourages development and use of ecologically and culturally appropriate technologies and resource use practices that strengthens our climate resilience.

Principle 4 – Consideration of timeframes

All projects are considered in terms of the short-, medium- and long-term progress towards meeting the objectives for resilient and healthy ecosystems and communities

Principle 5 – Ability to meet multiple objectives

All recovery projects consider opportunities that contribute to meeting multiple objectives for environmental, economic, social and cultural resilience and health that can also be met by the investment.

3.3 Hawke’s Bay Regional Council’s Role

After an event such as Cyclone Gabrielle one of the core functions of the Regional Council is to provide for flood control and catchment management. The Regional Council also has a unique role in relation to the recovery and resilience building of the region; as the only council that serves the entirety of the region there is a breadth of connection with communities and tāngata whenua across the whole of the Hawke’s Bay. The Regional Council has unique obligations under s.30 of the Resource Management Act 1991 (RMA) which requires the management of natural and physical resources in the region in order to

promote the sustainable management of the environment. The environment is at the heart of everything the Regional Council undertakes.

In addition to the RMA, the Regional Council has a number of other roles and responsibilities prescribed by other legislation such as the Local Government Act, the Soil Conservation and Rivers Control Act, and Land Drainage Act, among a number of other Acts. The Regional Council functions are significant in terms of the breath and type of activities which it encompasses; we work and engage with a number of treaty partners (PSGE's and taiwhenua) throughout the region, and there is a duty to undertake this work to serve them and the wider Hawke's Bay community, including stakeholders and industry. This work includes but is not limited to:

- Managing the risks associated with flooding and other natural hazards within their region. This includes developing and implementing flood management plans, providing flood warning systems, and managing river catchments and drainage systems;
- Providing advice and support to our communities around sound environmental practices which speak directly to 'working with te taiao' underpinned by regionally relevant science and research.
- Providing advice and support to farmers and growers on a range of issues related to environmental management, including soil and water quality, nutrient management, and sustainable land use practices, including erosion control. This may involve working with individual farmers or growers or with groups such as farming associations and industry bodies;
- Planning for climate change adaptation and mitigation. Adaptation involves adaptive measures such as managed retreat or seawalls, while mitigation aims to reduce emissions to prevent climate change. Successful combination of these strategies can improve our interaction with nature and provide for a resilient environment that supports human well-being;
- Engaging with the community and providing education and information on environmental issues and risks. It includes working with schools and other organisations to promote environmental awareness and sustainability. Working with local businesses and communities to support economic development within their region. This may include providing advice for sustainable use of natural resources, investing in infrastructure and facilities, and promoting tourism and other economic activities;
- Transport planning and funding within the region. Regional Council's work closely with Waka Kotahi and other stakeholders to develop and implement transport strategies and plans that reflect the needs and priorities of their region. They are also responsible for the provision of public transport.
- Working with local businesses and communities to support sustainable economic development within their region. This may include providing funding, advice and support to businesses, investing in infrastructure and facilities, and promoting tourism and other economic activities

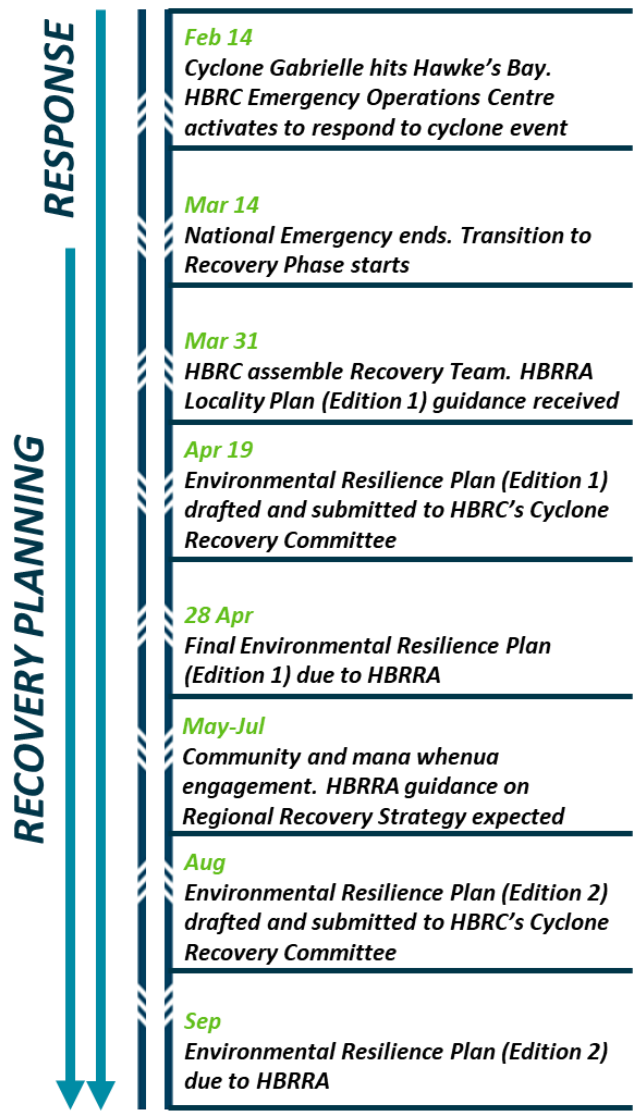
3.4 Scope

This first edition of the Environmental Resilience Plan outlines the immediate recovery actions undertaken and proposed by the Regional Council teams in response to the impacts of Cyclone Gabrielle. Specifically, this plan provides an outline of the Regional Council's immediate response and recovery

actions until mid-Aug 2023. The second edition of the Environmental Resilience Plan will be prepared by late September 2023 and will focus on longer term planning to aid the recovery of the region. This timeframe will allow more time to plan for and consult on medium- and long-term steps that will require more significant planning, effort and investment, potential examples of this are land use decision making or large-scale infrastructure investment.

It should be noted that the funding requests were submitted on the 14 April to the Recovery Agency to inform the collective request to Treasury (submitted by the Agency on behalf of the Regional Council, TLA's, NKII and PSGE's) to support the recovery of the region. It is acknowledged that the 2023/24 budget will not provide for all requests. There is a significant amount of uncertainty which surrounds the funding requests and how this then translates into the forthcoming Long Term Plan (LTP) for council. There needs to be further consideration as to how to reconcile the LTP with the current funding plan proposal, further funding requests and how this will be sequenced. Council will likely need to undertake further work to prioritise these proposals and set goals to recovery in light of what is necessary and affordable for the region. This alignment with the LTP does not form part of this first edition Environmental Resilience Plan.

Timeline from response to cyclone event to initial recovery planning:



3.5 How this document was prepared

The Environmental Resilience Plan is being prepared with the guidance of the Recovery Committee chaired by Cllr Sophie Siers and made up with regional councillors, Chair Hinewai Ormsby, Will Foley, Xan Harding, Thompson Hokianga, Neil Kirton, Charles Lambert, Jock Mackintosh, Di Roadley, Jerf van Beek and Martin Williams.

Seats are also held by Katarina Kawana and Mike Paku as the Māori Committee Representatives, and Tania Hopmans and Keri Ropiha as the Regional Planning Committee members. This representation provides the voice of tāngata whenua; however, it is acknowledged that this is not a substitute for engaging with tāngata whenua more broadly. Given the pace of the development of this first iteration of the Environmental Resilience Plan it has not been possible to engage meaningfully with our PSGE's, NKII, and taiwhenua. Looking to the preparation of the second edition of this plan preliminary discussions with some Post Settlement Governance Entities (PSGE's) and Ngāti Kahungunu have already commenced, to develop a way forward to ensure we are working together in partnership on behalf of our environment, tāngata whenua and the community.

This plan was prepared following the template that was developed and provided by the Hawke's Bay Regional Recovery Agency and is intended to be side by side the other locality plans prepared in the region.

In preparing the second edition of this plan it is anticipated to work with tāngata whenua and communities at place to inform decision making, take a 100-year view to make sure we recover in a manner that allows for future growth and development, and to attempt to create equity through the work the Regional Council undertakes. The Council will adopt community-centred processes and approaches in the spirit of collaboration and partnership.

3.6 Mana Whenua Engagement

The voices of mana whenua must be included throughout future planning.

- Customising engagement at small scales and across all tāngata whenua organisations poses resourcing difficulties. eg. how we would engage with mana whenua in Wairoa wouldn't necessarily be appropriate in Napier.
- Avenues of engagement are equally as important when initiating conversations. As composers of plans, we must use our existing relationships with mana whenua on a personal level and not an organisational one. Some Māori entity may be happy to kōrero transactionally, but we cannot assume this and must allow mana whenua to dictate their means of engagement.
- Capacity of mana whenua is further stretched in the recovery of the region and coordination between councils is critical to ensure successful engagement.

The Regional Council is planning to create an engagement strategy that would detail the approach we need to take for different areas/hapū, conversations we are looking to have, and how we can coordinate efficiently. Ideally, we would have co-authored this plan with mana whenua. Considering our breadth of required engagement in Hawke's Bay and the tight deadlines, HBRC has opted to weave a co-authored

engagement framework in the next plan due in September. This will ensure that we can compose a diligent recovery plan alongside mana whenua. To ensure a level of comfort is attained we will consult with our Māori Committee and Regional Planning Committee on this initial resilience plan.

The governance structure implemented to assist Hawke's Bay builds on the Matariki model. The Council governance structure is supported by the Council's Recovery Committee, and which builds on the established Regional Planning and Māori Committees. Management frameworks and relationships also exist amongst the Māori Partnerships teams within the Regional Council and district and city councils. HBRC plans to navigate the complexities of Māori engagement through coordinated communications with mana whenua and through:

- Our Māori Partnership team. We have relationship managers that maintain partnerships in all of Hawke's Bay. These managers will be critical in enabling proper engagement with Hawke's Bay mana whenua. Our staff also provide critical support to our Regional Council employees through sharing of deep understandings of Tikanga and Mātauranga.
- Te Kupenga, this is a forum of Māori relationship managers across councils. Te Kupenga is willing to coordinate to reduce the collective burden we all place on Mana whenua in informing our plans. This approach will also improve our engagement as it will become more informed due to appropriate information sharing across Te Kupenga.

New challenges for the region have prompted new ways of working together. This is an exciting time for greater collaboration and better outcomes for all. This is a shared vision among mana whenua and TLA's and must be enabled through meaningful engagement.

3.7 Community Engagement

The Regional Council recognises the crucial role of community voices, as it does with mana whenua. We want to ensure these are reflected in the second iteration of our Environmental Resilience Plan. An engagement strategy is being prepared by the Council. This will outline our considered approach for communication and engagement that allows us to have meaningful conversations with our communities.

The Council is mindful of the impact that Cyclone Gabrielle has had on people's ability to participate in these processes. Resources, including physical and mental energy levels, have been depleted as people focus on rebuilding their homes, businesses, and lives. To mitigate undue stress related to engagement, we will work closely with the Hawke's Bay Regional Recovery Agency and other councils and agencies to reduce consultation fatigue.

Despite the challenges ahead, the Regional Council is committed to including community input alongside mana whenua. Communities must have the opportunity to express what recovery means to them so that the Council can align its environmental recovery efforts with their needs and provide for the future resilience of Hawke's Bay meaningfully.

A key area of focus for the Regional Council is the primary sector and rural communities. As part of this, the council is particularly targeting engagement with the Primary Sector through a range of programs and initiatives that support rapid recovery while also accounting for wider and longer-term objectives for sustainable resource use and resilience.

Section 4: Profile of the region

4.1 Hawke's Bay

The Hawke's Bay region spans an area of 14,164 km² that approximately 182,700 people call home. It encompasses five major river systems and many smaller coastal catchments. The major systems include Wairoa, Mohaka, Ngaruroro/Tūtaekurī, Tukituki (Upper, Middle and Lower), and Porangahau. The smaller coastal catchments include Kopuawhara, Opoho, Ohuia/Whakaki, Waihua, Waikari, Aropaoanui, Waipatiki, Te Ngarue, Esk, Ahuriri, Karamu/Te Awa o Mokotūāraro (formerly Clive), Pouhokio, Mangakuri, Pourerere, Whangaehu, as well as several additional smaller catchments flowing directly to the sea.

The region has a diverse largely rural landscape comprising of mountain ranges to the north and west, 350km of diverse coastline (cliffs, estuaries, sand beaches, gravel beaches), seven major river systems, productive plains and hill country. Notable landforms in our region include Lake Waikaremoana, Mahia Peninsula, Cape Kidnappers and Te Mata Peak.

The Hawke's Bay region encompasses the four local Territorial Authorities of Wairoa District Council, Napier City Council, Hastings District Council and Central Hawke's Bay District Council, with Taupo and Rangitikei Districts intersecting parts of the region. The main cities are located close to each other Napier on the coast, and Hastings 17km inland. Smaller towns are Wairoa, Waipawa and Waipukurau and other small settlements are found throughout the region.

Farming, horticulture (apples, stone fruit, vegetables), wine and tourism are key industries in the Hawke's Bay. The creation of highly productive soils on the Heretaunga Plain from alluvial deposits means the region is well known for its high-quality food and beverage production, with two thirds of New Zealand's apples and pears grown in the Hawke's Bay. With a temperate climate and high-quality accommodation, hospitality and events tourism play a significant role in the region's economy. Art Deco celebration, the Mission Concert, F.A.W.C events, and the Hawke's Bay cycle trails all draw visitors to the region.

Transport linkages traverse the region with State Highway 2 running north to south and State Highway 5 running east to west. The region is also connected through Napier Port which supports the exports of wood and produce. Railway also connects the region to the south. Napier Airport is the main regional airport. These transport linkages support the supply and demand of goods and services coming from and to the region.

4.2 Historic Flooding Events

While the region is known for its temperate climate it is vulnerable to extreme weather conditions and has a history of weather events that have shaped the environment. By national standards Hawke's Bay's rivers are not large except for the Wairoa and Mohaka rivers. However, there have been many major damage-causing floods recorded. Individual floods have ranged in size from cyclonic storms that have caused regional flooding to localised downpours that have affected minor catchments or caused drainage systems to overflow.

Since 1867 there have been numerous major storms resulting in severe flooding in Hawke's Bay. The records date back 156 years and NIWA's Historic Weather Events Catalogue has ninety-seven separate events recorded. Notable regional weather events include flooding in 1897, 1924, 1938, and 1988.

The Easter Friday Floods of 1897 saw the Ngaruroro River breach its banks resulting in many houses and bridges being swept away including the rail bridge at Waitangi near Clive. Many residents of Napier and Hastings had to be rescued by boat and hundreds of families were homeless because of the destruction of their homes from floodwaters. The road from Napier to Taupo suffered severe damage with every bridge being swept away. There was significant loss of stock and thousands of acres of pastoral land was rendered unfit for use for many months afterwards.

March 1924 saw very heavy rain and floods experienced in the Hawke's Bay and northern districts. The heavy rain followed a very dry period resulting in widespread flooding and extensive damage, including to roads and bridges. There were many large wash outs and several bridges around the district were washed away or damaged. There was widespread damage to private and public property, and the roads to Taupo and Wairoa were blocked.

April 1938 saw prolonged heavy rain over three days which caused severe flooding. Most roads suffered from slips or flooding. The hardest hit area was Esk Valley in Hawke's Bay where most homes and farmland were buried by silt or ruined by floodwaters and landslides. In the lower Esk Valley, an area of 710 hectares was silted to an average of at least 1 m and depths of 3 m were found over larger areas. In the wider region there was unprecedented damage to roads, bridges, fences, livestock, and other property. Many families were forced to leave their houses while other families were completely isolated and had to have supplies dropped down to them by an aircraft over a period of weeks.

More recently one of the most damaging cyclones to hit the region was Cyclone Bola in 1988. It struck the Hawke's Bay and Tairāwhiti region slowing as it moved over the area resulting in continuous torrential rain for three days. This resulted in devastating floods, landslides, mass erosion, power outages, road closures and the failure of sewage systems. Flooding affected some 3600 hectares of farming and horticultural land, with the associated losses estimated at \$90 million. Insurance payouts for the whole event, at the time, totaled \$37 million excluding Earthquake Commission claims.

Apart from flooding our region is vulnerable to a number of other natural hazards including:

- Prolonged droughts
- Major rural fires caused by drought
- Earthquakes causing damage to buildings, infrastructure, and essential services and triggering landslides, avalanches, flash floods, fires, and tsunamis.
- Tsunami caused by an earthquake
- Volcanic ash wind-directed from Mount Ruapehu, Taupo Volcanic Centre, and Mount Taranaki
- Coastal inundation and erosion caused by severe coastal storm swell events
- Large-scale landslips after prolonged wet weather

The Regional Council is also tasked with managing water resources across the region, and while not classed as a natural hazard, droughts are also natural events. Their impact on our communities and

freshwater ecosystems can be significant and this needs to be factored into future climate change resilience planning.

Section 5: How Cyclone Gabrielle impacted our region

5.1 What happened?

Gabrielle was a Category 3 tropical cyclone, originating from the Coral Sea that tracked towards the north-east of the North Island of New Zealand. The most severe weather impacted Hawke's Bay on Sunday 12 February and Monday 13 February, then reduced in intensity. At the onset of the cyclone, Hawke's Bay had already recently experienced the wettest 6-month period since records begun. Rivers were expected to rise responsively to rainfall.

Hawke's Bay Regional Council (HBRC) assessed that this was the largest recorded rainfall event in the region for several sites. Actual rainfall during Gabrielle exceeded forecasts by as much as 250mm. Of note was the Glengarry gauge, used to monitor the Esk Valley, which received 501mm over 24 hours - equal to nearly six months of rainfall and between 1am and 7am. Gabrielle delivered about 320mm of rain to our Newstead site, in the western hills of the Ahuriri catchment near Puketapu, which is about one-third of the usual annual rainfall there – most of it falling within 24 hours.

Hawke's Bay Civil Defence Emergency Management (HBCDEM) declared a State of Emergency on Tuesday 14 February 2023 at 0431hrs. A State of National Emergency was then declared by NEMA at 0843hrs 14 February 2023.

Extensive rain and rapidly rising rivers lead to extensive and widespread flooding across the region. Hawke's Bay sadly experienced the loss of human lives and significant stock losses caught up in the swift flowing flood waters. Many other people were trapped on their rooftops or cars and needed rescue by helicopter or boat during the event.

Houses and buildings were flooded and inundated with silt, and people's possessions were lost or damaged placing huge pressure on our communities. However, communities came together to provide food, shelter, and necessities to those affected, and help start the clean-up of properties to allow people to start their recovery process. The loss of critical infrastructure (power, cellular coverage and roading) for many days following the Cyclone caused widespread unrest for Hawke's Bay communities, even those not directly affected by floods.

5.2 Cyclone Gabrielle's impacts

The impact on people, communities and the region's economy has been severe and wide ranging due to the scale and geographic scope of the event. This section discusses the impacts from Cyclone Gabrielle that relate to the Environmental Resilience Pou and the work that the Regional Council is responsible for. Further local detail about the cyclone impacts on people will be found in the regional Locality Plans.

Flood Protection - There were approximately 6km of breaches in our 248 km stop bank network and a further 28km of the network were damaged by erosion in this unprecedented flooding event (see figure 1 & 2 below). There was a total of 30 breaches to our network. Stopbanks did not appear to fail through piping (erosion of the internal structure of the stopbank), rather the design capacity of the river channel was exceeded and the stopbanks were overtopped. At many locations this led to erosion of the landward side slope of the stopbank due to the large uncontrolled volume of water moving at speed overtop of the crest, and then down the outer slope. When the integrity of the landward side of the stopbank was compromised, the fast-moving water then eroded the central core of the stopbank back to the river side, creating the breach.

In some bridge locations, debris became trapped on the upstream side of the bridge, limiting the flow through the bridge opening, which led to high water levels in the river channel on the upstream reach from the bridge. These high-water levels then flowed out of main channel and over high ground or over stopbanks. Pre-cyclone, HBRC had begun a programme of stopbank upgrades, improving the resilience of the banks by increasing their structural integrity, as well as raising their height to accommodate greater capacity in the channel. An upgrade to the stopbank on the left bank of the Tutaekuri River at Taradale was completed late last year, which proved vital in protecting much of Napier from catastrophic flooding, demonstrating the benefits of such upgrades.

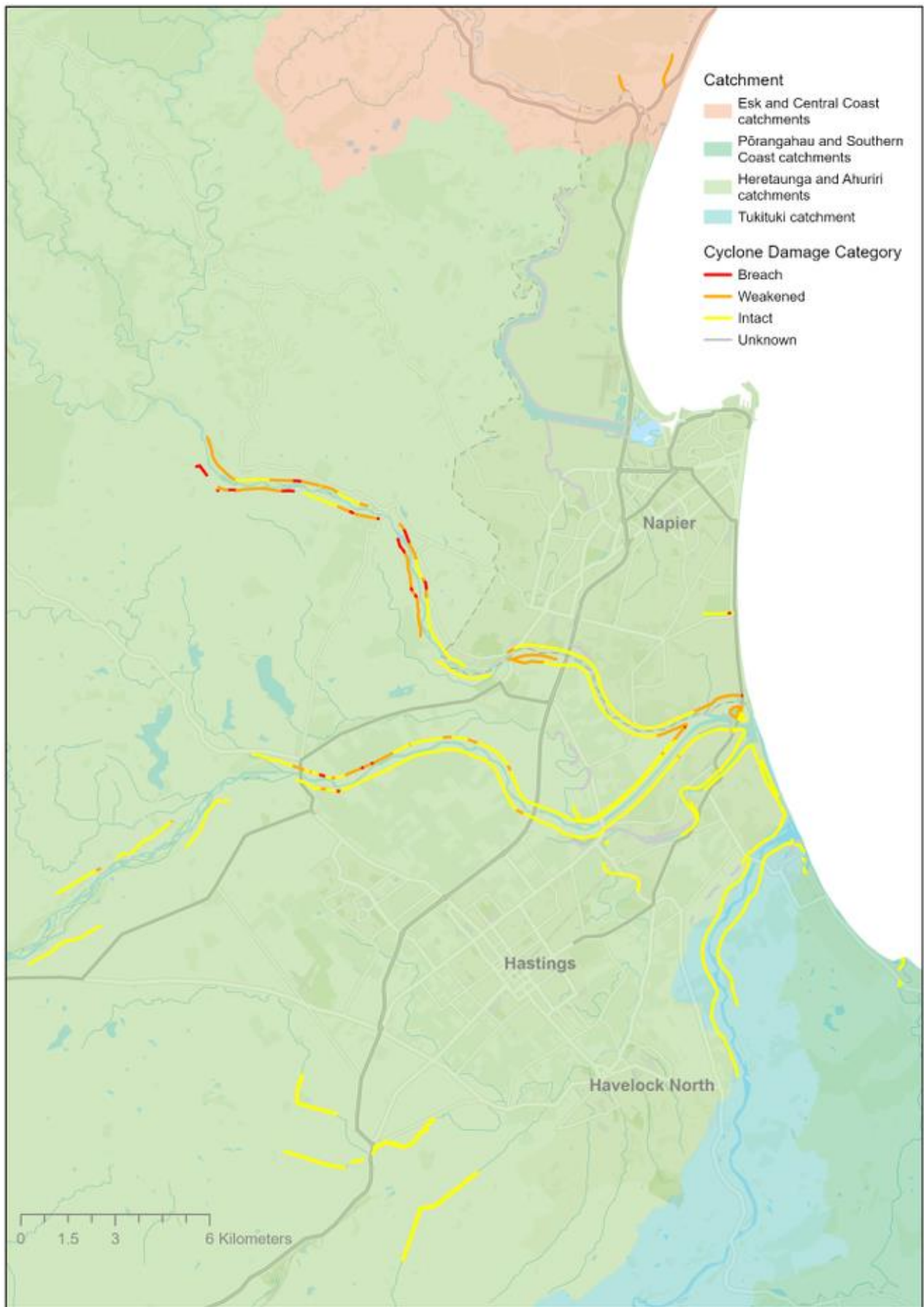


Figure 1. Heretaunga Stopbank Cyclone Gabrielle Damage

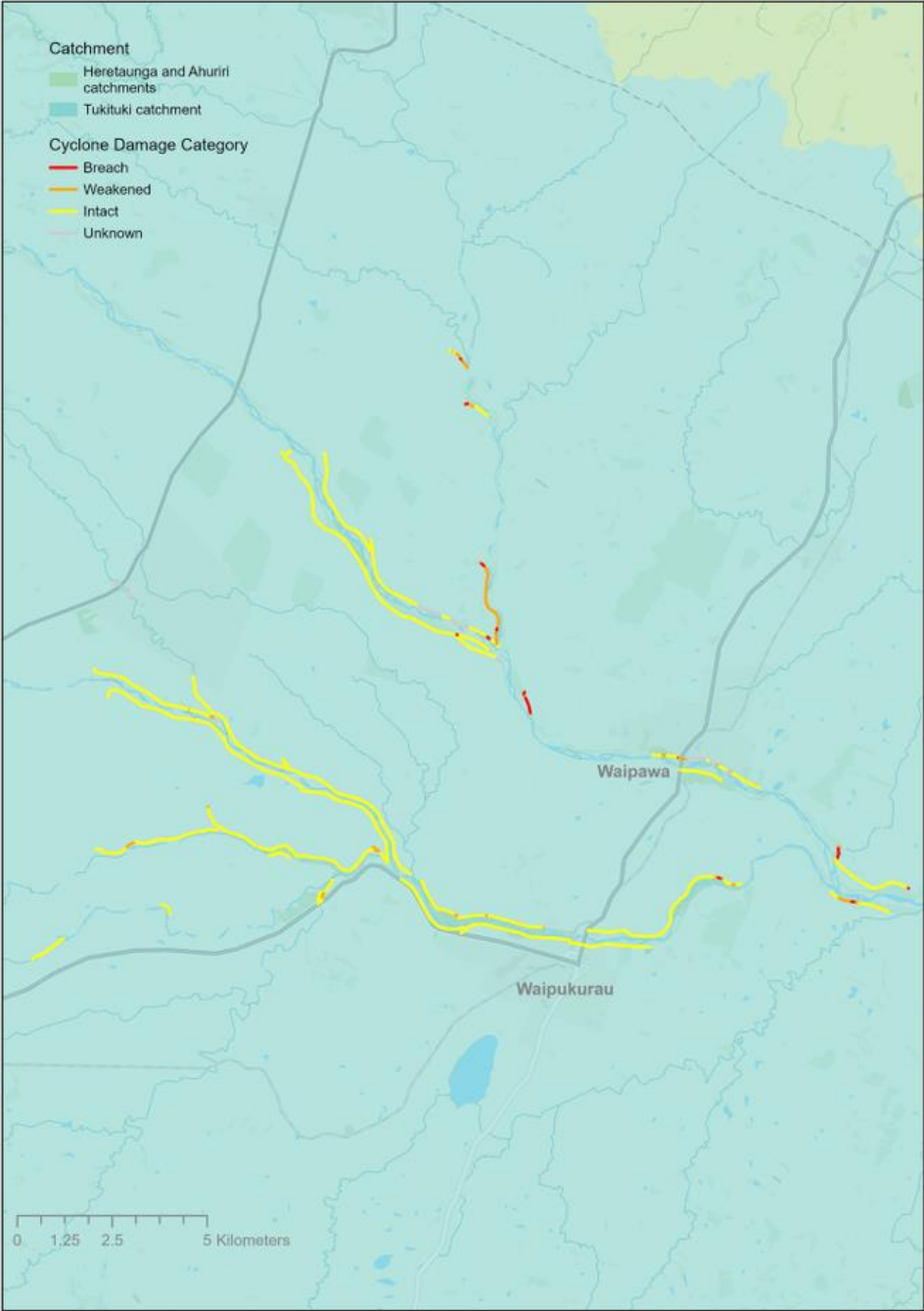


Figure 2. Central Hawke’s Bay Stopbank Cyclone Gabrielle Damage

Regional Council's Rapid Repair teams are working on all breaches. The immediate focus has been on putting temporary protection in place around breaches which includes bunding (gravel banks) and waterproof plastic wrap, moving to restoring the stopbanks to their original design standards. It is estimated that this work will take 6-9 months.

Drainage networks - Drains across the region were blocked with a combination of woody debris, leaf litter and silt. Drain clearing will need to be repeated as new rainfall continues to wash silt back into drains. Silt deposited up to 3 metres deep will have longer term impacts on drainage and management of surface runoff during rainfall events that is still to be fully understood. Numerous pump stations along drainage systems were impacted and during the event and the days and weeks following had to be supported 13 self-contained repair pods. Work on clearing drains will continue as silt continues to wash into drains: many are requiring to be dug out multiple times. The Council is planning in the next couple of weeks to fly over drain areas and seed the silt near the drains. This will help stabilise the drain areas.

Rainfall and River Flow Monitoring Network - The Council has a network of 53 river and 78 rainfall monitoring sites. Communication with over 100 rain and river level monitoring sites was lost on Monday 13 February. A significant number of sites and instruments used for rainfall and river monitoring were damaged or lost as shown in the image below. Restoration of these sites and building in redundancy for communications is required.

Land - The cyclone devastated land across the region with numerous slips and landslides, and stream and riverbank erosion, while other land has been buried under meters of silt. The erosion and associated sediment have wide-ranging ecosystem and productivity impacts from the loss of soil and through deposition in the lower catchment areas, on infrastructure and in houses, and in freshwater, estuaries and coastal waters. Despite losing some of the river sediment sampling monitors, we know the amount of sediment that entered our rivers, lakes, estuaries and marine areas was extreme and the impact of the silt and sediment on communities, infrastructure and buildings and natural ecosystems has been extensive. Effects on the aquatic life is also significant across freshwater and coastal ecosystems and may continue to impact these systems for years to come as sediment works its way through. Observations and initial surveys to date show that soil loss and deposition impacts are variable across the region and even within catchments at close spatial scale. The map below (figure 3) shows the bare land areas of pastoral hill country where landslides and slips have occurred. This is an initial analysis based on pastoral hill country and further detail across the region is still being collated.

Summary map of landsliding in cyclone Gabrielle 2023

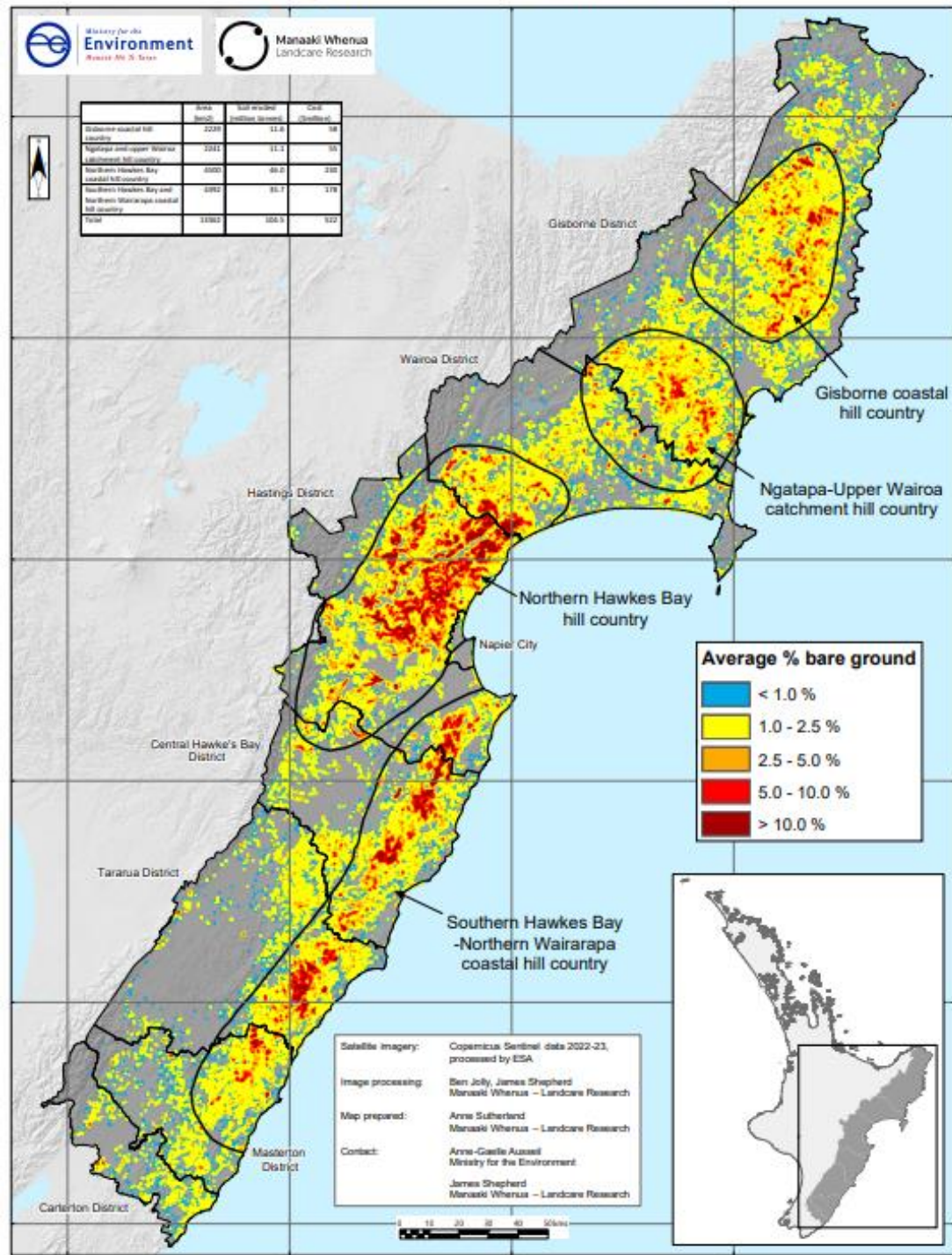


Figure 3. Landslide density estimate (bare-land) for LUC Classes 6 & 7 using Sentinel-2 Satellite Imagery. Prepared by Manaaki Whenua Landcare Research on behalf of Ministry for the Environment.

Air - The cyclone left large amounts of silt across the landscape. As this dries it contributes to windblown dust which has an impact on human health as it is breathed in. There is on-going air quality monitoring with a particular focus on the human health effects of silt. The process of silt clean-up has also meant

people have breathed in contaminants and have been exposed to illnesses such as leptospirosis resulting in recommendations to use PPE equipment.

Water - Some of the Council's State of the Environment monitoring sites have been found to have minimal or no aquatic life while other macroinvertebrates and fish were present when the flood waters started to recede. The impact on aquatic life depends on a range of factors including location in the landscape, levels of intactness and connectivity, amount of sediment and its composition and whether there were areas of refuge for aquatic life during the flood. Longer-term observation will show if the aquatic community as found before the cyclone can re-establish again in the silt-impacted gravel beds. This will depend on upstream areas for recolonisation, where aquatic life persisted through the storm. The level of connectivity to and inputs from groundwater also seems to be relevant to rates of aquatic life recovery, with water clarity in some groundwater-fed streams improving after a few weeks.

Sediment is already known to be a major stressor on freshwater and coastal ecosystems. The full impact of the flood flows and sediment on freshwater and marine ecosystems is yet to be fully understood and quantified, and this is a high priority area for intensive monitoring and research. Observations on sediment deposition show variability that can be significant for recolonisation: while some silt layers on the riverbed seem to be of a composition that is easily mobilised, silt in other areas seems to form a compacted layer between gravel, armouring the stream bed and making gravel hard to move – this could affect the recolonisation of the gravel bed.

The impacts on lake ecosystems are likely to be significant and long-term. The water in Lake Tūtira is still highly turbid after almost two months. The storm related deposited sediment layer on the lake bottom will not be moved through as in river systems, and the sediment is likely to cause changes to nutrient dynamics and algal blooms long-term, with likely effects on the aquatic community composition. Recovery may take decades as seen in the effects of Cyclone Bola on Lake Tūtira. Monitoring and sediment coring will give more information on the recovery path of Tūtira and potentially other affected lakes in the region.

The heavy rain and flooding flushed contaminants from urban and rural land into waterways, resulting in ongoing water quality impacts. Not all industries and wastewater management is up to pre-cyclone levels and there are ongoing impacts on water quality including for swimming and fishing. Water quality monitoring is ongoing.

Marine & Coast - Further analysis is still required to fully understand the scale of the impact on the marine ecosystem. Marine survey vessels are being deployed over the next two months to assess state of ocean floor including understanding the impacts on the highly significant ecosystems at Wairoa and Clive Hard and the Pania Reef. For some locations including estuaries, there's an immediate effect, with silt already accumulating. Sediment landing on the seafloor or on rocky reefs will smother animals and plants. As the initial accumulations disperse away, there is an increase in turbidity, and a longer-term effect of silt being resuspended and dispersed around and generally browning those coastal waters. All of these ecosystems are dependent on plant growth – microscopic phytoplankton or large kelps and seaweeds. Suspended sediments in the water column stop some light from hitting the seafloor and this reduces growth and impacts on aquatic life dependant on these plants.

Our understanding of the timeframes required to achieve better ecosystem health for our marine systems prior to the Cyclone indicated decades of work in reducing sediment inputs and changes in fisheries methods. The current event has likely exacerbated existing issues in the marine environment and will continue to do so for years to come as sediment mobilised by the Cyclone works its way through the landscape and into the sea.

Biosecurity - Flooding displaces many pest animal populations from their natural habitat and may impact on biosecurity risks from wider spread of plant pests such as Chilean needle grass. Widespread debris and spoilt agricultural produce is reported to have fuelled increase in rodent populations. The results of these changes may not be fully realised for some time.



Photo: Waitangi Estuary looking towards Cape Kidnappers

The natural ecosystems will have different rates of recovery. New equilibriums may result for some ecosystems following the major disruption from the cyclone. For others, it may take years or decades for recovery back to pre-cyclone state. On-going data collection and monitoring is critical to inform decisions about management responses and priorities for recovery work in the medium and longer term.

Climate Change - Using the first ever Regional Community Carbon Footprint as a baseline, we were developing the first regional Emissions Reduction Plan (ERP) with workshops underway with a practitioner group and planned coverage of seven topics (Agriculture, Planning and Infrastructure,

Building and Construction, Waste, Working with Nature, Transport and Forestry). Post Cyclone the planned workshops have been cancelled due to practitioner and SME availability. Subsequently the scope of the ERP has been reduced to four chapters: Waste, Working with Nature, Transport and Emissions considerations in the rebuild. Another workstream underway, a spatial based regional climate change assessment, has taken on more importance and is progressing with Urban Intelligence developing the online climate change vulnerabilities map.

Waste - The flood event collected vast amounts of wood debris and channelled it through the extensive river network and eventually out to sea. The result of this has seen huge amounts of wood deposited on coastlines, river sides, piled up at bridges and washed onto flooded land. The flooding also resulted in large volumes of waste from flooded homes, rural properties and infrastructure. Household items, destroyed infrastructure, posts and wire from cropping lands, vehicles as well as woody debris and silt has fetched up across the landscape. This has created environmental risks from contamination as well as significant impacts on primary production. Waste removal from productive land remains a significant issue.

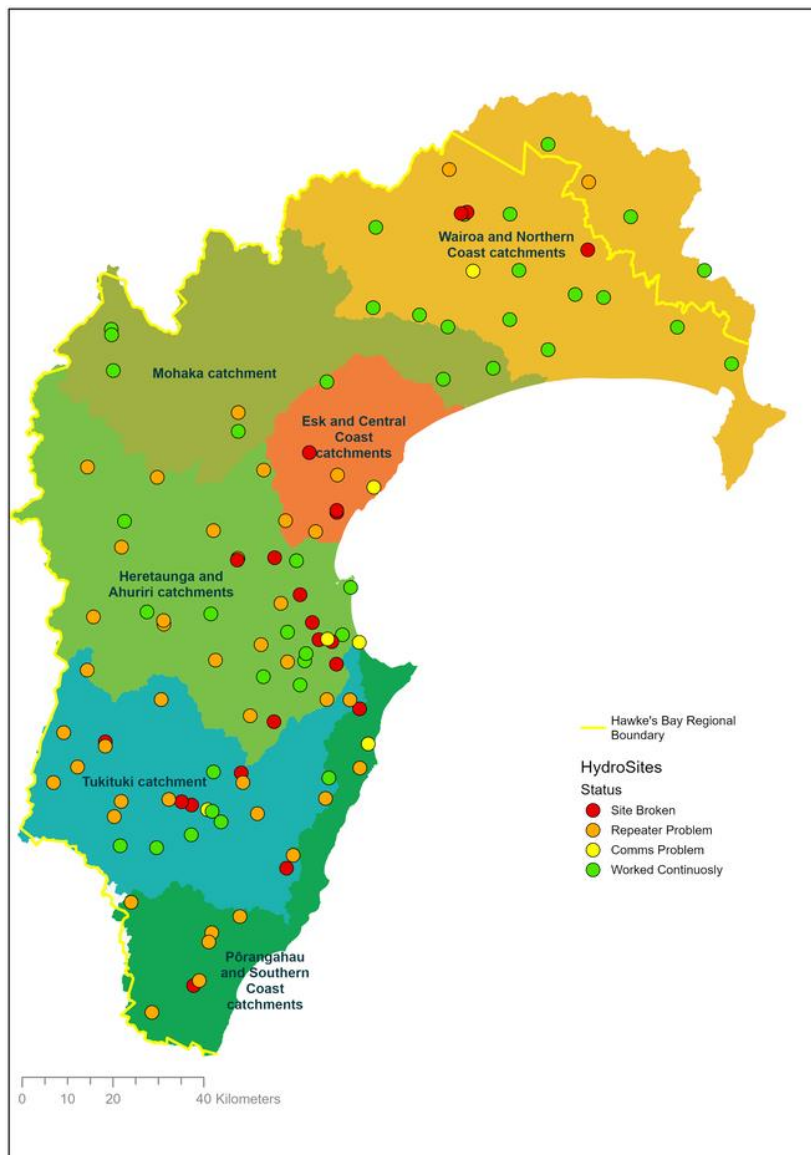


Figure 4. Hydro site status during immediate aftermath of Cyclone Gabrielle

Transport - The most significant infrastructural damage has been to the region's bridges and roading network, cutting off communities from main centres and causing ongoing traffic issues. Roads were impacted by multiple large slips and silt build up. There has been significant disruption to the Public Transport network as a consequence of this damage, resulting in reduced services particularly between Napier and Hastings. It is anticipated that more detail about impacts on the transport network is contained in the locality plans. Marine transport was also affected with Napier Port having to shut down for a number of days and a survey having to be undertaken to ensure the approach to the port was safe for use. Also, a number of navigational buoys had to be repositioned after they had drifted during the storm.

Regional Park & Trails - Close to 30% of the Hawke's Bay Cycle Trail network was damaged and unable to be used due to stopbank damage, roading/trail slips or destroyed bridges. Trees, debris and access issues meant HBRC needed to close parks until they can be cleared and made safe for the public, however all our regional parks are now open except for Tūtira Regional Park.

National Legislation, Policy Statements and Regulations - The Regional Council has a statutory obligation to give effect to legislation, such as the Resource Management Act, national policy statements, and implement national environmental standards. Cyclone Gabrielle has impacted the council's ability to meet the associated timeframes and undertake the required meaningful consultation.

Landowners are also focussed on recovery of infrastructure and fencing and are unable to meet timeframes in national legislation for things such as stock exclusion.

It is important to recognise that undertaking many of our 'business as usual' work programmes in these circumstances for iwi, rural landowners, community, councillors, and staff will be difficult. The organisation and its partners do not have enough people resource, time or money to achieve all that is currently required by legislation. Additionally, it will divert resources away from the recovery effort, which must be the priority for the region, at least in the near term.

The Regional Council has been actively involved with the government's legislative changes introduced to enable response and recovery efforts following Cyclone Gabrielle. The Council supports this flexibility in responding to natural disasters and sees this as an important component of the response and recovery efforts.

Regional Council will be seeking supporting Orders in Council that, among other things, provide flexibility with regards to obligations to meet prescribed timeframes in overarching legislation. It will also be seeking changes to obligations for implementing the NPSFM and NES-F.

The Regional Council will be requesting that the timing requirements and current statutory obligations which are driven by the NPSFM and NES-F are adapted for the Hawke's Bay region so that we might focus our attention on Cyclone recovery.

Section 6: Recovery objectives, priorities, and decisions

The following table outlines the recovery initiatives undertaken already or anticipated to be undertaken in the short term and aligns them with the relevant objectives and priorities. The objectives set out the vision that this plan seeks to achieve in the near-term, while the priorities outline which actions are most important to achieving the objectives. The priorities are more specific than the objectives and are the things that need to happen to achieve the objectives. It is intended to show a link between the overall objectives for recovery, what the priorities are, and the recovery initiatives to tell a consistent story of the immediate recovery plan. As requested in the guidance from the Recovery Agency the objectives as defined in this plan have been linked to the Hawke's Bay Recovery Framework objectives as shown below.



The table below also shows the alignment of this plan with other key strategies such as the Regional Council's Long-Term Plan and Strategic Plan. It also notes where a project or action was previously outlined in a separate plan, but now needs to be accelerated because of the Cyclone.

The following table is dependent on the key decisions that are still to be made;

- Where, when, and how managed retreat will occur
- How recovery initiatives are to be funded
- Input and engagement from tāngata whenua
- Input and engagement with communities
- Orders in Council to amend, alter or remove legislative requirements

	Recovery Initiative	Objective(s)	Priority	HB Recovery Framework Objectives	Links to Other Key Strategies	Does this work need to be accelerated?
Environmental Resilience: Flood Protection	Repair compromised flood protection infrastructure and provide interim, medium and long-term community and property protection	<ul style="list-style-type: none"> • Stopbanks are immediately repaired with interim measures and • Stopbank re-instatement and betterment programmes developed • Levels of service and stopbank design standards, needs of vulnerable areas and riparian management are reviewed 	High	<ul style="list-style-type: none"> • Fit for purpose infrastructure and lifelines • Working with Te Taiao • Climate resilience and adaptation 		
Environmental Resilience: Flood Protection	Review of current flood protection schemes for community protection and healthy functioning rivers	<ul style="list-style-type: none"> • Inform appropriate locations for land use activities and housing • Inform layers for potential spatial planning • Development of options for the community cost and benefits, managed retreat, opportunities for the environment 	High	<ul style="list-style-type: none"> • Fit for purpose infrastructure and lifelines • Working with Te Taiao • Climate resilience and adaptation 	LTP	Yes
Environmental Resilience: Flood Protection/ Waste	Develop solutions for silt, wood debris, and mixed waste (solid waste management) solutions	<ul style="list-style-type: none"> • Ongoing co-management of silt/ wood debris removal and disposal with Hasting District Council following cyclone Separation of mixed waste (orchard farm waste) • Understand sources of woody debris and silt entering water ways and assess measures for reducing sediment and woody debris 	High	<ul style="list-style-type: none"> • Working with Te Taiao • Climate resilience and adaptation 		Yes

	Recovery Initiative	Objective(s)	Priority	HB Recovery Framework Objectives	Links to Other Key Strategies	Does this work need to be accelerated?
		<ul style="list-style-type: none"> Investigation of repurposing of silt and wood debris 				
Environmental Resilience: Flood Protection/ Indigenous Ecosystems, Biodiversity, and Conservation/ Climate Change	Replace and improve environmental measuring and monitoring equipment to enable the organisation to continue to provide important data that regulatory outcomes are dependent upon. Future proofing of data monitoring systems so as to avoid system failure in future events.	<ul style="list-style-type: none"> Regional Council has access to suitable monitoring and measuring equipment and data including by: <ul style="list-style-type: none"> replacement, repair and improvement of existing networks, new technologies to improve delivery and functioning of networks Building more resilient monitoring networks, systems and processes 	High	<ul style="list-style-type: none"> Fit for purpose infrastructure and lifelines Working with Te Taiao Climate resilience and adaptation 	LTP	Yes
Environmental Resilience: Catchment Management/ Indigenous Ecosystems, Biodiversity and Conservation/ Resource Management and Land Use	Review effectiveness of Erosion Control scheme to determine if fit for purpose or needs revising	<ul style="list-style-type: none"> Asses the effectiveness of erosion control and environmental improvement works and prioritise repair work Review current programmes strategies and assess need for any change Assess damage to works carried out under sustainable land use funding (ESC, FIF, Hotspot funding) 	High	<ul style="list-style-type: none"> Working with Te Taiao Climate resilience and adaptation 	LTP	Yes

	Recovery Initiative	Objective(s)	Priority	HB Recovery Framework Objectives	Links to Other Key Strategies	Does this work need to be accelerated?
		<ul style="list-style-type: none"> Re-assess role of wetlands in local hydrological systems 				
Environmental Resilience: Catchment Management/ Resource Management and Land Use Primary Sector: Rural Recovery Economic Growth: Sector	Develop systems, processes, tools and advice to landowners to assist with recovery and future resilience	<ul style="list-style-type: none"> A Rural Recovery Strategy supports, coordinates and assists development and delivery of the rural recovery and resilience programme The Land for Life programme including management systems, financing and development of sustainable land use tools and advice is scaled up, extended and fast-tracked Catchment and landowner advisory services are available including for erosion control advice and funding 	High	<ul style="list-style-type: none"> Primary Sector Fit for purpose infrastructure and lifelines Working with Te Taiao Climate resilience and adaptation 	LTP L4L	Yes
Environmental Resilience: Catchment Management Primary Sector: Rural Recovery Economic Growth: Sector	Increase supply of erosion control plant materials	<ul style="list-style-type: none"> Increase tree nursery capabilities to meet increasing demand Expand plant and labour capacity Jobs for nature types of investment 	High	<ul style="list-style-type: none"> Climate resilience and adaptation Working with Te Taiao 	LTP	

	Recovery Initiative	Objective(s)	Priority	HB Recovery Framework Objectives	Links to Other Key Strategies	Does this work need to be accelerated?
Environmental Resilience: Catchment Management/ Resource Management and Land Use Primary Sector: Rural Recovery	Develop digital online geospatial platform for recovery farm plans	<ul style="list-style-type: none"> Farm planning processes are streamlined and efficient to allow a significantly nimbler approach to managing implementations and changes in the future within a management regime that accounts for the cyclone impacts on the primary sector 	High	<ul style="list-style-type: none"> Fit for purpose infrastructure and lifelines Working with Te Taiao Climate resilience and adaptation 	New	Yes
Environmental Resilience: Indigenous Ecosystems, Biodiversity and Conservation	Understanding Cyclone Gabrielle and its impacts on our region including natural ecosystems. This will provide a region wide impact assessment of the Cyclone on the environment across the region.	<ul style="list-style-type: none"> Measure and quantify the Cyclone to provide data for future management and infrastructure design Measure and quantify the effects of the cyclone on freshwater ecosystems including wetlands, rainfall and river flows, marine ecosystems Measure and quantify the effects of the cyclone on freshwater ecosystems including wetlands, rainfall and river flows and marine ecosystems. air quality effects on human health 	High	<ul style="list-style-type: none"> Working with Te Taiao Climate resilience and adaptation Fit for purpose infrastructure and lifelines 	New and BAU State of the Environment Monitoring	Yes

	Recovery Initiative	Objective(s)	Priority	HB Recovery Framework Objectives	Links to Other Key Strategies	Does this work need to be accelerated?
		<ul style="list-style-type: none"> terrestrial ecosystems and biodiversity land damage and soil loss groundwater recharge and spring flow biosecurity 				
Environmental Resilience: Indigenous Ecosystems, Biodiversity and Conservation	<p>Replace and improve environmental measuring and monitoring equipment to enable the organisation to continue to provide important data that regulatory outcomes are dependent upon.</p> <p>Future proofing of data monitoring systems so as to avoid system failure in future events.</p>	<ul style="list-style-type: none"> Regional Council has access to suitable monitoring and measuring equipment and data including by: <ul style="list-style-type: none"> replacement, repair and improvement of existing networks, new technologies to improve delivery and functioning of networks, building more resilient monitoring networks, systems and processes 	High	<ul style="list-style-type: none"> Fit for purpose infrastructure and lifelines Working with Te Taiao Climate resilience and adaptation 	LTP	Yes
Environmental Resilience: Climate Change	Understand Climate Change Vulnerabilities to inform future planning	<ul style="list-style-type: none"> Develop a regional spatial change vulnerability map Undertake gap analysis 	High	<ul style="list-style-type: none"> Working with Te Taiao Climate resilience and adaptation 	LTP	Yes

	Recovery Initiative	Objective(s)	Priority	HB Recovery Framework Objectives	Links to Other Key Strategies	Does this work need to be accelerated?
	Managing Emissions	<ul style="list-style-type: none"> Undertake Greenhouse gas inventory review 	High	<ul style="list-style-type: none"> Fit for purpose infrastructure and lifelines Working with Te Taiao Climate resilience and adaptation 	LTP	Yes
All pou	Develop frameworks and systems for iwi involvement	<ul style="list-style-type: none"> Iwi involvement is resourced. Mauri restoration is enabled by developing programme and resources 	High	<ul style="list-style-type: none"> Working with Te Taiao Genuine partnership with Māori 		
Whānau/ Community Wellbeing: Welfare	Revenue and Financial Policy Review	<ul style="list-style-type: none"> Review rates allocation (who pays and how much) in light of Cyclone Gabrielle to ensure that they are appropriate 	High	<ul style="list-style-type: none"> Working with Te Taiao 	LTP	Yes
Environmental Resilience: Resource Management & Land Use	Plans & Policies: Support recovery through appropriate legislative requirements.	<ul style="list-style-type: none"> Adopt a staged approach to meeting national freshwater objectives that accounts for cyclone impacts. Amend legislative programme and requirements, including timeframes for delivery of National Policy Statements and compliance with National Environmental Standards 	High	<ul style="list-style-type: none"> Fit for purpose infrastructure and lifelines Working with Te Taiao Climate resilience and adaptation Genuine partnership with Māori 	LTP Annual Plan RPS Review RRMP Review	Yes

	Recovery Initiative	Objective(s)	Priority	HB Recovery Framework Objectives	Links to Other Key Strategies	Does this work need to be accelerated?
		<ul style="list-style-type: none"> • Provide for recovery farm plans that are transitioned to new national requirements for freshwater farm plans in a way that reflect cyclone impacts • Amend existing legislative requirements for freshwater farm plans and resource consents 				
Environmental Resilience: Resource Management & Land Use/ Climate Change	Natural Hazard and Climate Change vulnerabilities mapping to inform future spatial planning	<ul style="list-style-type: none"> • Develop spatial plans to advise regional development for buildings, structures and infrastructure and investment into ecosystem improvements. 	High	<ul style="list-style-type: none"> • Fit for purpose infrastructure and lifelines • Working with Te Taiao • Climate resilience and adaptation 	RPS Review RRMP review	Yes
Primary Sector: Rural Recovery Economic Growth: Sector	Negotiating sustainable financing and partnerships	<ul style="list-style-type: none"> • Co-ordinated engagement with banks, other financiers & partners, and insurance providers to explore short- and long-term options for farmers 	Medium	<ul style="list-style-type: none"> • Working with Te Taiao • Genuine partnership with Māori • Addressing inequities • Stronger productive economy 	LTP	Yes
Environmental Resilience: Indigenous	Review impact of Cyclone on Biodiversity Programme to	<ul style="list-style-type: none"> • Review current programmes and develop targeted catchment scale 	Medium	<ul style="list-style-type: none"> • Working with Te Taiao 	LTP	Yes

	Recovery Initiative	Objective(s)	Priority	HB Recovery Framework Objectives	Links to Other Key Strategies	Does this work need to be accelerated?
Ecosystems, Biodiversity and Conservation	determine if this remains fit for purpose or needs revising	<p>advice to support regional biodiversity</p> <ul style="list-style-type: none"> Undertake planning on retirement, reversion, native planting, flood plain management, resilient ecosystems and wetland management 		<ul style="list-style-type: none"> Climate resilience and adaptation 		
Environmental Resilience: Indigenous Ecosystems, Biodiversity and Conservation	Iwi mātauranga	<ul style="list-style-type: none"> Development of mātauranga monitoring 	Medium	<ul style="list-style-type: none"> Genuine partnership with Māori Working with Te Taiao Addressing inequities 	Regional Statement of the Environment	No
Resilient Infrastructure: Transport	Functioning, sustainable and resilient transport networks	<ul style="list-style-type: none"> Transport networks and freight movements are repaired, and communities are connected 	High	<ul style="list-style-type: none"> Fit for purpose infrastructure and lifelines Working with Te Taiao Climate resilience and adaptation Addressing inequities 	LTP Waka Kotahi KiwiRail TLAs Locality Plans	Yes
	Transport networks that support active and public transport	<ul style="list-style-type: none"> Active and public transport meets needs of communities Transport options support carbon neutral transport objectives Transport networks are resilient 	Medium			

Section 7: Roles & responsibilities

7.1 Partnering with other agencies

The Regional Council will be working with a multitude of agencies, entities, sector representatives etc to assist and support the recovery of the region. There is likely no aspect of our community that we will not touch upon or have an interaction with. Note: the list below is not fully comprehensive but provides an indication of some of the agencies we are collaborating and engaging with.

- National Science Challenge – NIWA, Sustainable Seas, Cawthron, Manaaki Whenua, University of Canterbury, GNS.
- Central and local Government - MPI, MfE, DIA, MBIE, City and District Councils
- Stakeholders and NGOs –Fish and Game, Forest and Bird, Department of Conservation, NZTA, Waka Kotahi, Biodiversity Hawkes Bay, Te Whatu Ora
- Primary Industry Partners – Beef & Lamb, HortNZ, NZ Apple and Pears, Dairy NZ, Federated Farmers etc

7.2 Leadership of this Resilience Plan

The Hawke’s Bay Regional Recovery Framework that was established by the interim Regional Recovery Manager Keriana Brooking, required each TLA and the Regional Council to appoint a Recovery Manager.

The role of the Recovery Manager is to coordinate the development of the Locality Plan, or for the Regional Council, the Environmental Resilience Plan, and to be the main connector between HBRC, the other councils Recovery Managers and the Regional Recovery Agency.

HBRC has also made the decision to repurpose the existing Environment and Integrated Catchment Committee to a Recovery Committee, that will allow Governance oversight to the Recovery work programme. The figures below set out how this governance structure will look.

The below figures show the regional recovery governance structure, and how HBRC have structured recovery and pou teams to align with the Hawke’s Bay Regional Recovery Framework.

HBRC Recovery Team Governance Structure

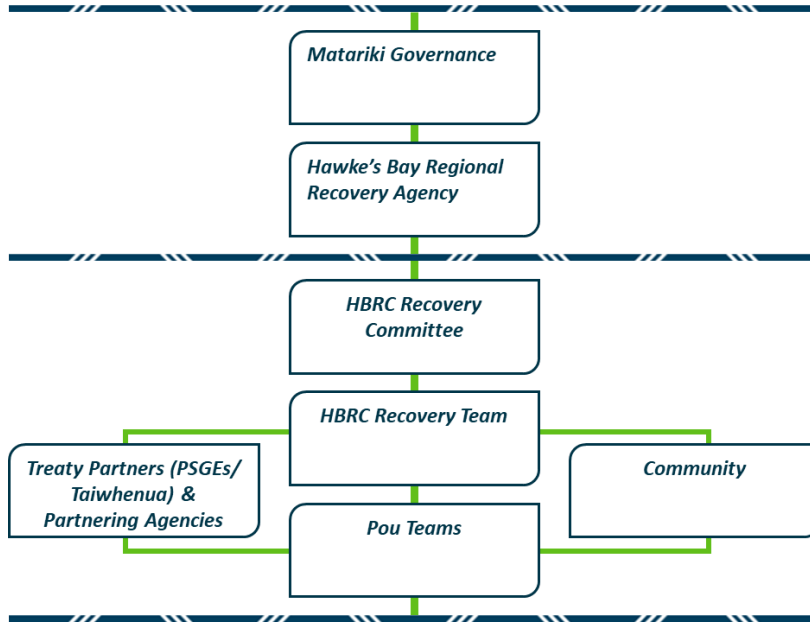


Figure 5. Recovery governance structure and our relationships with our community and key partners.

HBRC Recovery Team Structure

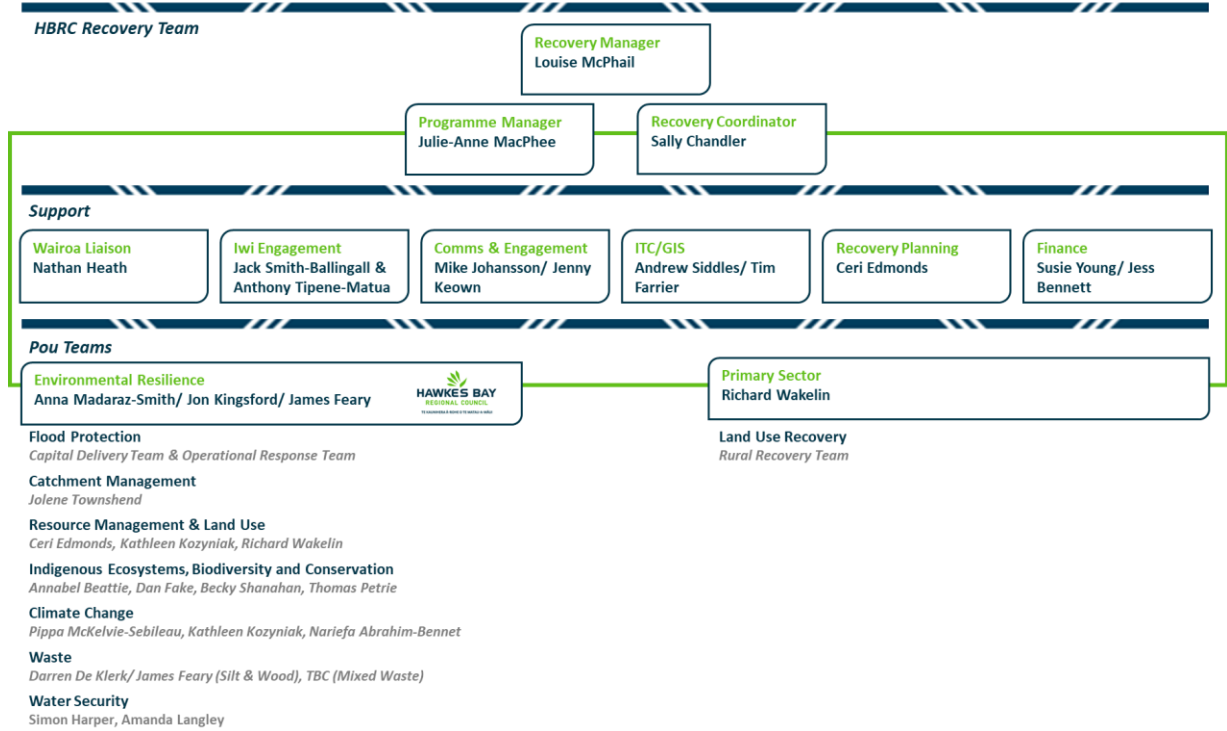


Figure 6: HBRC’s Recovery Team structure and Pou Teams.

Section 8: Recovery initiatives

The table below outline the proposed and current initiatives, including approximate timings, costs and potential partners.

Cost range key

●	<\$500k
●●	\$500k-\$2m
●●●	> \$2m

Recovery initiatives	Project	What will be done?	Indicative timing	Potential partners	How this initiative will support objectives and priorities	Cost	Source of Funding
Flood Protection	Review of flood protection levels of service	Review levels of service and locations for river stopbanks and flood protection	2023-2024		Understanding flood protection needs and levels of service will help support resilient communities, while at the same time recognising the needs of river ecosystems and healthy functioning.	●	
		Development of options for the community cost and benefits, managed retreat, opportunities for the environment					
Review flood protection needs and level of service of vulnerable areas							
Review riparian management							
Review stopbank design standard							
	Heretaunga Plains and Upper Tukituki scheme review						
	Rapid repair of flood protection	Urgent interim stopbank repairs and rapid flood infrastructure to pre-cyclone levels of service within 9 months	Underway – end 2023		Repair of flooding and drainage networks protects communities and infrastructure from the effects of flooding. It enables climate resilience for flooding events. The way resilience by managing rivers within confined stopbanks is also subject to review.	●●●	TBC

Recovery initiatives	Project	What will be done?	Indicative timing	Potential partners	How this initiative will support objectives and priorities	Cost	Source of Funding
Flood Protection	Longer term repair and improvements to flooding and drainage protection network	Develop packages for complex and highly complex works involving betterment (eg. pumpstation upgrades, spill gates and overland flow paths)	2023-2024	TLAs, PSGEs		●●●	TBC
Flood Protection/ Waste	Cyclone silt and wood debris management	Removal of wood debris and existing vegetation from sites with potential to exacerbate future flooding or erosion risks along District rivers	Underway		This will support decisions about investment into recovery work programmes including for erosion control and sustainable land use	●●●	TBC
		Understand sources of woody debris and silt and review measures to reduce losses in future events	Underway	NIWA MfE		●●	TBC
Catchment Management	Effectiveness of erosion control measures	Review the effectiveness of existing erosion control work on landslide mitigation during Cyclone Gabrielle. Review extent of erosion to hills and streambanks, riparian planting & fencing lost	Mid 2023	Manaaki Whenua		●●	TBC
	Assessment of wetlands to provide flooding and drought protection	Calculation of wetland potential to dampen high flows and hold water during periods of drought.	2023	NIWA MfE GNS		●	TBC

Recovery initiatives	Project	What will be done?	Indicative timing	Potential partners	How this initiative will support objectives and priorities	Cost	Source of Funding
Catchment Management	Land for Life (L4L) project	Build up resources, including management systems, financing and sustainable land use advice and tools to support landowner decision making and sustainable land use investments	2023-2024	The Nature Conservancy (TNC)	This work will contribute to meeting objectives for: <ul style="list-style-type: none"> Working with Te Taiao not against Climate resilience and adaptation 	●●	TBC
		Develop system for prioritising L4L support					
Establish L4L advisory team							
Include resilience planning and funding options							
Develop further implementation tools, supporting processes and systems over time.							
	Development of Riparian Management Plan	Longer term strategy developed for the management of waterways and riparian margins along the district's main waterbodies, and a program of works factored into the next LTP to undertake it	Underway		Planning for efficient and effective riparian management enables: <ul style="list-style-type: none"> Climate resilience and adaptation Working with Te Taiao not against 	●●	TBC

Recovery initiatives	Project	What will be done?	Indicative timing	Potential partners	How this initiative will support objectives and priorities	Cost	Source of Funding
					Fit for purpose infrastructure and lifelines		
Rural Recovery	Establishment of Rural Recovery Team	Developing Rural Recovery Strategy	Underway	MPI Relevant Industry Groups	This will support all primary sector recovery work programmes ensuring integration across all programmes and other key entities and organisations. It will contribute to supporting all regional objectives	●●	Internal secondments
	Impact Assessment Survey of farmers, growers, and landowners	Survey farmers/landowners/growers to understand impact and effects of Cyclone Gabrielle	Underway	MPI Relevant Industry Groups		●●	
	Recovery Farm Plans	Funding/support provided to land users undertaking future farm plans to incorporate greater hazard risk assessments and work programs to reduce risks associated with erosion to farm infrastructure, future land use and	2023	NKII PSGE's Mana whenua	This project will support primary industry cyclone recovery and co-ordinate other recovery projects.	●●	TBC

Recovery initiatives	Project	What will be done?	Indicative timing	Potential partners	How this initiative will support objectives and priorities	Cost	Source of Funding
		river margin protection to reduce potential downstream effects.			It will also provide the mechanism for considering longer term objectives for economic and environmental outcomes and sustainability and resilience.		
Rural Recovery	Impact Assessment Survey of farmers, growers, and landowners	Survey farmers/landowners/growers to understand impact and effects of Cyclone Gabrielle	Underway	MPI Relevant Industry Groups		●●	TBC
		Combine information from HortNZ survey to complete horticulture/viticulture status to understand current state and prioritise recovery focus					
	Establish parameters for measuring recovery	Benchmarking and quantification of the impacts of Cyclone Gabrielle on the physical, cultural and ecological state of our rivers and monitoring sites.	2023	NIWA MfE Manaaki Whenua	This project will support accountability and efficiency for recovery programmes	●●	TBC
	Mauri restoration framework	Development of a mauri restoration framework for environmental and cultural values (& mahinga kai) recovery	2023	NKII PSGE's		●●	TBC

Recovery initiatives	Project	What will be done?	Indicative timing	Potential partners	How this initiative will support objectives and priorities	Cost	Source of Funding
		Resourcing for participation in the recovery process and development of Iwi or Hapū specific recovery plan		Mana whenua			
Rural Recovery	Rural Community Engagement	<ul style="list-style-type: none"> Ongoing community, landowner and primary industry engagement, workshops and recovery initiative extension. 	Underway	MPI Relevant Industry Groups		●●	
Flood Protection/ Indigenous Ecosystems, Biodiversity and Conservation/ Climate Change/ Water Security	Environmental information site impact/ damage survey	All Environmental Information sites need surveying. Benchmarks need level checks or reinstallation; cross sections need to be relevelled and all site staff gauges need rechecking.	Underway		These improvements to the monitoring network will ensure the Council has modern, resilient and fit-for-purpose infrastructure, equipment, technology and systems to enable it to carry out its river and rainfall monitoring. Good data will support decision making about levels of service and design for infrastructure as well as ensure the Council	●	TBC

Recovery initiatives	Project	What will be done?	Indicative timing	Potential partners	How this initiative will support objectives and priorities	Cost	Source of Funding
					and community can effectively respond to natural hazards from storm events.		
Flood Protection/ Indigenous Ecosystems, Biodiversity and	Rebuild and replace flood monitoring site access	Site access has been compromised at sites across the region. Heavy track building equipment is required to rebuild and replace access so E.I can visit and maintain critical sites. Some rivers (Ngaruroro at Whanawhana) will need rerouting, so it flows past E.I's flood monitoring equipment.	Underway			•	TBC
	Non-Contact discharge measuring system	<ul style="list-style-type: none"> New equipment that is not on bridges that can give remote river flows at remote sites. <p>This would include the system and the construction of these sensors at specific high priority sites.</p>	2023			•	TBC
	Investment and installation of new environmental monitoring cameras	High quality day/night cameras mounted at critical sites so flow can be derived at flows and real time assessment of sites can occur. Cameras could also monitor the screens at pump stations and the data could be displayed in HydroTel.	2023-2024			•	TBC

Recovery initiatives	Project	What will be done?	Indicative timing	Potential partners	How this initiative will support objectives and priorities	Cost	Source of Funding
Flood Protection/ Indigenous Ecosystems, Biodiversity and Conservation/ Climate Change/ Water Security	Investment in STIV Software for environmental monitoring	Software to calculate and compute real time flow from data captured from camera and drone footage.	2023-2024			●	TBC
	Environmental Data Information storage - cloud hosting	<ul style="list-style-type: none"> HydroTel could be hosted in the cloud, so data is looked after 24/7 and is always available. This option was explored in 2019 and cost was considered too much, Cyclone Gabrielle proved that the cost would have been worth it. <p>This would cover hosted infrastructure, disaster recovery, maintenance and support functions.</p>	2023-2024			●	TBC
	Environmental Information - Satellite Loggers	During Cyclone Gabrielle it was found that satellite loggers were the best source of data when the radio and cell towers failed. All 18 satellite loggers worked through the cyclone, and we now need to expand the satellites to cover all the critical sites.	2023-2024			●	TBC
	Telemetry and flood warning systems review	Review HBRC telemetry and flood warning systems to ensure they were sufficient for this event across the district. Invest in new equipment	Underway	NIWA GNS		●●●	TBC

Recovery initiatives	Project	What will be done?	Indicative timing	Potential partners	How this initiative will support objectives and priorities	Cost	Source of Funding
		including fixed cameras for image velocimetry where appropriate.					
Flood Protection/ Indigenous Ecosystems, Biodiversity and Conservation/ Climate Change/ Water Security	Environmental Information - Back up sites	At all critical sites there is a need for proper back up. This should include two different and separate communication paths, two loggers, two sensors and enough power needs to cover the site working on its on for up to a week.	2023			•	TBC
	Environmental Information - Towers to monitor floods	It has been found that proper engineered towers that were built in the 1960's have continued to withstand floods across NZ. With the building of new bridges across HB now would be a great time to include proper structures to monitor floods along with the rebuilds. Unfortunately, these towers cost a lot of money but have the ability to withstand enormous pressure and have shown they work across NZ.	TBC			•	TBC
	Environmental Information - Repeater stations	The Cyclone proved we need to own and operate our own repeater stations as the only one to fail was the only one HBRC doesn't own and maintain	TBC			•	TBC

Recovery initiatives	Project	What will be done?	Indicative timing	Potential partners	How this initiative will support objectives and priorities	Cost	Source of Funding
Flood Protection/ Indigenous Ecosystems, Biodiversity and Conservation/ Climate Change/ Water Security	Environmental Information - Slacklines	Traffic management regulations won't allow us to measure off bridges to collect water flow and sediment information. An alternative is to build permanent slacklines at selected sites where bridges no longer exist or are unsuitable.	TBC			•	TBC
	Environmental Information - FTE's	To install, monitor and maintain the new sites, installations and carry out research work for science and other sections of Council another 5 people would be required.	TBC			•	TBC
	Environmental Information - Drone	The ability to have a drone and suitable qualified staff available for an event to take footage that E.I can use both during the event and post the event would have been outstandingly useful	TBC			•	TBC
	Environmental Information - Assessment sites and systems	Cyclone Gabrielle showed the need for regular external reviews of our Telemetry system and network. A yearly review would show if we were prepared and had sites and system available to cope.	TBC			•	TBC
	Environmental Information - IVR	Integrated voice recognition system capable of automatically notifying	TBC			•	TBC

Recovery initiatives	Project	What will be done?	Indicative timing	Potential partners	How this initiative will support objectives and priorities	Cost	Source of Funding
		<p>consent holders and members of the public flood levels and or advice. Takes the person out of the equation.</p> <p>We have an old version but went for a cheaper version initially many years ago. With the aftermath of the Cyclone now would be a great time to upgrade to an automated notification system.</p>					
Flood Protection/ Indigenous Ecosystems, Biodiversity and Conservation/ Climate Change/ Water Security	Environmental Information - Vehicle tracking system	A wall mounted screen that allows the tracking of vehicles and can also show who is in and out of the office on any day and time. Great for reception and managers of field people.	TBC			•	TBC
	Environmental Information - PumpTel and HydroTel	<p>Add these two systems together to provide back up for each other.</p> <p>One supplies details for pump stations – water height, pump status etc and the other supplies water level and flow data but the systems could link. One is used by operations group and one by Dalton street staff.</p>	TBC			•	TBC
	Environmental Information - Survey Planes	The ability to get data from survey planes (Lidar) and imagery that can turn	TBC			•	TBC

Recovery initiatives	Project	What will be done?	Indicative timing	Potential partners	How this initiative will support objectives and priorities	Cost	Source of Funding
		images into flow measurements during storms.					
Indigenous Ecosystems, Biodiversity and Conservation/ Climate Change/ Water Security	Impact Assessment: Develop understanding of Cyclone Gabrielle related overland flow and landslide induced soil loss and deposits	<p>Collection of region wide LiDAR imagery to determine digital elevation differences.</p> <p>The value of LiDAR comes from its application in making very accurate and fine scale measures of the shape of the ground, and Hawke's Bay is in the unique position that LiDAR was flown in 2020 making an extremely valuable dataset for pre- and post-natural disaster.</p>	2023-2024	NIWA LINZ MfE	This will contribute to flood hazard mapping, river capacity changes, erosion control management and effectiveness monitoring and support all of the regional objectives	●●	TBC

<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Indigenous Ecosystems, Biodiversity and Conservation/ Climate Change/ Water Security</p>	<p>Quantification of land damage</p>	<p>Assessment of the change to land cover and amount to land damaged in the region.</p>	<p>Mid 2023</p>	<p>Manaaki Whenua</p>	<p>Understanding the extent, and scale of the cyclone impacts will help support all of the regional recovery objectives and will:</p> <ul style="list-style-type: none"> • Help develop and prioritise recovery investment, including as part of rural land recovery programmes, and investment into ecosystem recovery. • Update information about state of water bodies and relationship with values for natural resources • Provide understanding about ecosystem resilience • Provide understanding about cyclone 	<p>●●</p>	<p>TBC</p>
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Recovery initiatives	Project	What will be done?	Indicative timing	Potential partners	How this initiative will support objectives and priorities	Cost	Source of Funding
					impacts at landowner and property scale to help guide recovery action		
Indigenous Ecosystems, Biodiversity and Conservation/ Climate Change/ Water Security	Cyclone impact on terrestrial ecosystems	<ul style="list-style-type: none"> Assessment of areas of riparian damage using HBRC riparian programme. 	2023	NIWA MfE GNS		●●	
		<ul style="list-style-type: none"> Historic wetland mapping coupled with inundation areas to inform areas for wetland restoration 					
		<ul style="list-style-type: none"> Biodiversity loss/damage - Stratified monitoring of Priority Ecosystem sites to assess damage 					
		<ul style="list-style-type: none"> River and coastal bird surveys to determine impacts 					
		<ul style="list-style-type: none"> Assessment of vegetation re-establishment in wetlands in affected areas 					

Recovery initiatives	Project	What will be done?	Indicative timing	Potential partners	How this initiative will support objectives and priorities	Cost	Source of Funding
Indigenous Ecosystems, Biodiversity and Conservation/ Climate Change/ Water Security	Cyclone impact on freshwater	Undertake the following monitoring;	2023-2024	NIWA MfE		●●	TBC
		<ul style="list-style-type: none"> Monthly MCI samples at freshwater sites to determine the effect of Cyclone Gabrielle on freshwater systems and inform ecosystem recovery timeframes 					
		<ul style="list-style-type: none"> Lowland stream sediment quality monitoring 					
		<ul style="list-style-type: none"> Habitat mapping of severely impacted sites 					
		<ul style="list-style-type: none"> Targeted study on the Waitangi Stream area due to ingress from highly contaminated Awatoto site 					
		<ul style="list-style-type: none"> Whitebait habitat restoration of impacted sites 					
		<ul style="list-style-type: none"> eDNA monitoring at state of the environment sites 					

Recovery initiatives	Project	What will be done?	Indicative timing	Potential partners	How this initiative will support objectives and priorities	Cost	Source of Funding
Indigenous Ecosystems, Biodiversity and Conservation/ Climate Change/ Water Security	Cyclone impact on groundwater	<ul style="list-style-type: none"> Assessment to understand changes to recharge dynamics due to changes from silt/erosion caused by changes in bathymetry from Cyclone Gabrielle. 	2023	NIWA MfE GNS		●●	TBC
		<ul style="list-style-type: none"> Assessment to understand changes in contributions to low flows and spring flows 					
		<ul style="list-style-type: none"> Monitoring of groundwater quality and bores 					
	Cyclone impact on Lakes	<ul style="list-style-type: none"> Monitoring of Deep coring of offshore lake sediments to assess the impact of Cyclone Gabrielle compared to historic flood sediment layers to inform ecosystem recovery timeframes. 	2023	NIWA MfE GNS		●●	TBC
<ul style="list-style-type: none"> Lake SPI reassessment 							

Recovery initiatives	Project	What will be done?	Indicative timing	Potential partners	How this initiative will support objectives and priorities	Cost	Source of Funding
Indigenous Ecosystems, Biodiversity and Conservation/ Climate Change/ Water Security	Cyclone impact on Marine and Coast	<ul style="list-style-type: none"> Additional twice-monthly estuarine monitoring and assessments to determine the effect of Cyclone Gabrielle on estuarine systems and inform ecosystem recovery timeframes. 	2023-2024	NIWA MfE GNS MPI Iwi		●●	TBC
		<ul style="list-style-type: none"> Update the Hawke’s Bay Marine Degradation and Recovery model to include Cyclone Gabrielle to assess temporal timeframes for recovery and associated mitigation requirements 					
		<ul style="list-style-type: none"> Deep coring of offshore marine sediments to assess the impact of Cyclone Gabrielle compared to historic flood sediment layers to inform ecosystem recovery timeframes. 					
		<ul style="list-style-type: none"> Marine sediment quality assessment – effects of Cyclone Gabrielle 					

Recovery initiatives	Project	What will be done?	Indicative timing	Potential partners	How this initiative will support objectives and priorities	Cost	Source of Funding
Indigenous Ecosystems, Biodiversity and Conservation/ Climate Change/ Water Security		<ul style="list-style-type: none"> Marine subtidal ecosystem assessment – impacts from Cyclone Gabrielle (ROV) 					
		<ul style="list-style-type: none"> Assessment of sediment transport from rivers into Hawke’s Bay from Cyclone Gabrielle 					
Climate Change	Regional Climate Change vulnerabilities assessment	<ul style="list-style-type: none"> Further detailed data of natural hazards that considers climate change is needed to support our existing hazard models and vulnerability maps. 	2023	NCC HDC WDC CHBDC	Informs spatial planning to support all of the regional objectives	•	TBC
	Emissions reduction plan	<ul style="list-style-type: none"> First iteration of the Regional Emissions Reduction Plan will be prepared and present the targeting actions around transport, waste, working with nature and emissions considerations in the rebuild. 	May 2023	NCC HDC WDC CHBDC	Give effect to national direction and manage local emissions and support all of the regional objectives	•	LTP

Recovery initiatives	Project	What will be done?	Indicative timing	Potential partners	How this initiative will support objectives and priorities	Cost	Source of Funding
Whānau/ Community Wellbeing	Revenue and Financial Policy Review	<ul style="list-style-type: none"> Review rates allocation (who pays and how much) in light of Cyclone Gabrielle to ensure that they are appropriate 		Working with Te Taiao			LTP
Transport	Transport infrastructure rebuild	<ul style="list-style-type: none"> Support transport infrastructure rebuilding to connect communities Adopt a multi-modal approach to rebuilds wherever appropriate Support re-instatement of freight network – minimising disruption to supply chains 	Underway		Transport rebuild initiatives will align with objectives in the RLTP for a resilient transport network, reducing emissions, increasing use of public and active transport, reducing travel demand and delivery a safe transport network.		TBC

Recovery initiatives	Project	What will be done?	Indicative timing	Potential partners	How this initiative will support objectives and priorities	Cost	Source of Funding
	Public and active transport	<ul style="list-style-type: none"> • On-going delivery of efficient public transport • Undertake assessment to understand opportunities around active transport (cycling and walking) for building back better • Advocate for active transport options to be included in the redevelopment of road, bridges and stopbanks 	TBC				

Section 8: Funding

Attached as Appendix 1 is a spreadsheet outlining the estimated funding requirements for this plan in more detail. This spreadsheet was submitted to the Regional Recovery Agency on 14th April 2023.

Section 9: Support

The Regional Council is connecting with multiple agencies and departments to support the recovery of the region. For instance, there has been funding support from MBIE Extreme Weather funding Stage 0 which has provided a crucial mechanism enabling fast deployment and capture of perishable data that will be integral to informing flood modelling in the future.

There will however be significant requests for additional funding and resources to support ongoing initiatives, such as LiDAR and satellite coverage, engagement with tāngata whenua and communities, working with our rural sector, flood frequency analysis and assessment of impacts on the natural environment and examining the effectiveness of erosion control, as examples.

Te Uru Kahika have recently implored upon Prime Minister Chris Hipkins and Minister Grant Robertson to support Government co-investment to the value of \$200m per annum for the next 3 years to support river related flood risk resilience improving infrastructure to meet agreed levels of service within a decade across the motu. However, as a consequence of Cyclone Gabrielle, it is recognised that there is an immediate need for additional funding for Hawke's Bay flood risk resilience improvement works. Co-investment in selected and urgent investigative, design and approval initiatives and implementation of works will be necessary to ensure our communities are resilient, risk to lives is minimised and providing security to network utility infrastructure, and reinvestment in homes and businesses.

Regional Council will be seeking supporting Orders in Council that, among other things, provide flexibility with regards to obligations to meet prescribed timeframes in overarching legislation. It will also be seeking changes to obligations for implementing the NPSFM and NES-F.

The funding request submitted to the Recovery Agency on the 14 April provides extensive details regarding work which will enable recovery and costs associated with this, so should be read in tandem with this Plan.

Section 10: Implementation

As noted in previous sections of this Plan there are a number of short-, medium- and long-term initiatives that will be necessary to develop in response to Cyclone Gabrielle to support the recovery of the region. It is hoped that in the long term these initiatives will put us back on track to achieving the purpose set out in the Strategic Plan of working with our community to protect and manage the regions precious taonga or rivers, lakes, soils, air, coast and biodiversity for health, wellbeing and connectivity'. However, there is a long road ahead.

Our environment, which includes its people, have taken a brutal beating as a consequence of Cyclone Gabrielle. There are some things that we do know and can report and record (much of which informs the body of this plan), but it is acknowledged that there is much that we do not know. We will need to continually evolve, learn and understand how we can become more resilient to these types of weather events. The investigations and research will provide the entire country with better level of understanding of how we should be working and living within our environment.

It is difficult to say precisely what these milestones are within this first edition of the Environmental Resilience Plan. We know that there is work to be done and it will take time. Some works are more urgent than others. Monitoring of our natural environment with greater frequency will be crucial to our future planning. Spatial planning, hazard mapping and assessment of areas at risk will be an ongoing workstream which will in turn assist in future planning processes.

As far as the environment is concerned this work will be with a view to 100 years, to make sure we recover in a manner that allows for future growth and development, and to attempt to create equity through the work the Regional Council undertakes. The Council will adopt processes and approaches that are innovative, deliberate, transformative and inclusive.

The second edition Environmental Resilience Plan will incorporate extensive engagement with our treaty partners and community. An Engagement Strategy will support this work and set key dates and milestones.

Section 11: Next steps

As noted above there are a number of next steps beyond the submission of this first edition Environmental Resilience Plan to the Recovery Committee, many of which require further planning and thought. However, immediate next steps are as follows:

- Develop an Engagement Strategy for the period of May- September 2023 to inform the development of the second edition plan
- Engage with mana whenua and communities at place

- Work closely with TLA's and the HBRRA to ensure a coordinated approach to regional recovery
- Continue to work with Ministries around necessary Orders in Council
- Ongoing and more frequent monitoring of our environment
- Look for opportunities within our recovery work to achieve long term improvements for the environment and community
- Look for synergies between the recovery work and 'business as usual' to avoid engagement fatigue.
- Look for opportunities to tie recovery work into future processes eg. spatial planning
- Develop the Long-Term Plan with recovery at the fore.