Meeting: Rangitāiki River Forum

Meeting Date: 15 November 2024

Tabled Documents

Agenda Item 9.1 PhD Research Project

Agenda Item 9.2 Eastern Bay Spatial Plan

Agenda Item 9.3 Dama Wallaby Programme Progress Update

The Story of Three Rivers: Using geomorphic history to inform catchment-based river management

Jacqui McCord – PhD Candidate
Supervisors: Gary Brierley and Jon Tunnicliffe

THE UNIVERSITY OF AUCKLAND NEW ZEALAND | SCIENCE SCHOOL OF ENVIRONMENT | BAY OF PLENTY REGIONAL COUNCIL TOI MOANA

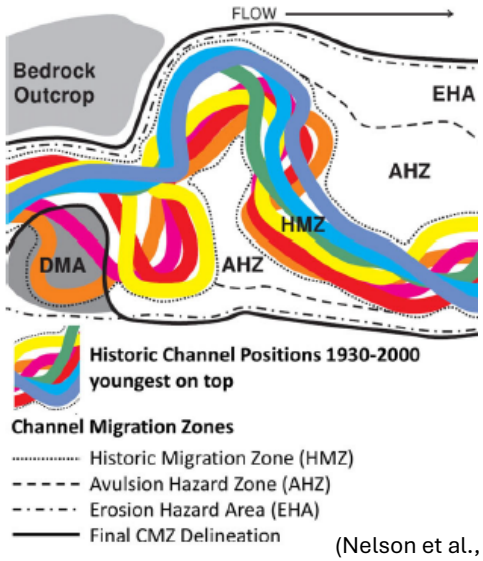
A move towards living with living rivers

- Many communities in Aotearoa New Zealand are at risk of flooding.
- Previous river management techniques have led to degradation of our waterways
- There are increasing calls to live with our living rivers, giving them space to move and flood.

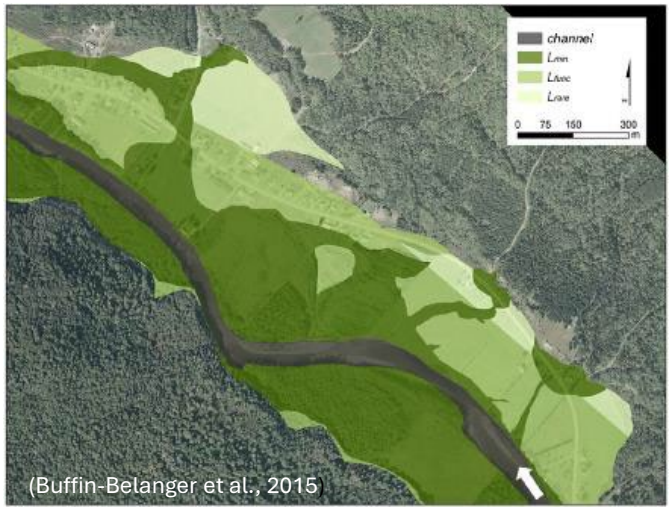
Edgecumbe Flood, 2017, Sky View Photography NZ

What is ‘Room-to-move’?

- ‘Room-to-move’ is a form of river restoration that embraces river adjustment (erosion and flooding) in a defined corridor.
- River adjustment and the width of erodible corridor varies based on the geomorphic context (geography and history) and catchment conditions (flow, sediment and roughness).
- Aerial photographs, historical records and remote sensing data (LiDAR) can be used to assess the historic range of variability and adjustment of a river.



(Nelson et al., 2024)



(Buffin-Belanger et al., 2015)

Every River is Unique…
Geography and history matter

Flow
The volume of water and how it moves through the catchment

- From the hillslopes into the rivers and streams
- From the tributaries to the main stream
- Flooding

Sediment
The size, volume and type of material being transported by the river

- Gravel
- Sand
- Silt and clay

Roughness
Things on the valley floor which interact with the flow

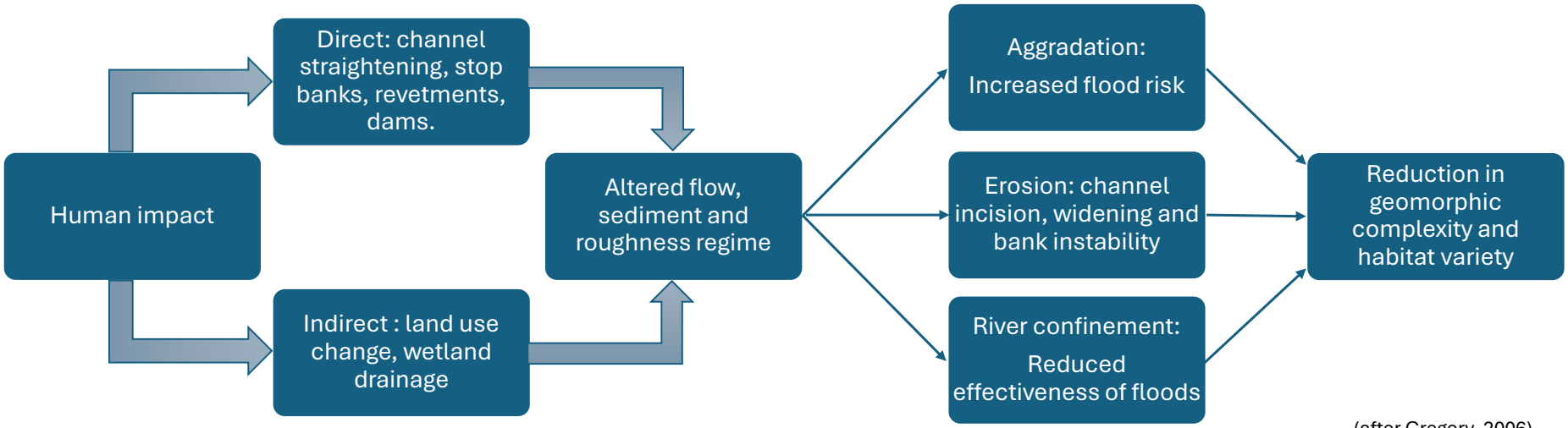
- Vegetation and wood
- Sediment


Tauranga River, Te Urewera


Tarawera River, Kawerau

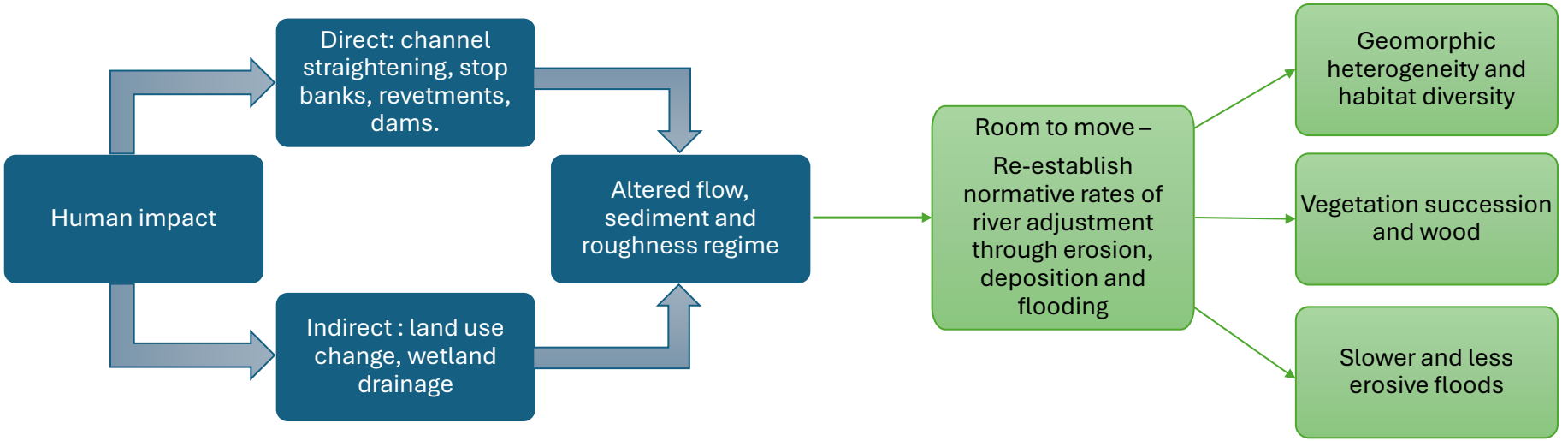

Rangitāiki River, Kaingarao Plateau

Human impacts to rivers



(after Gregory, 2006)

Human impacts to rivers



(after Beechie et al, 2010, Kondolf, 2011)

It re-establishes the processes that create and sustain river and floodplain ecosystems.

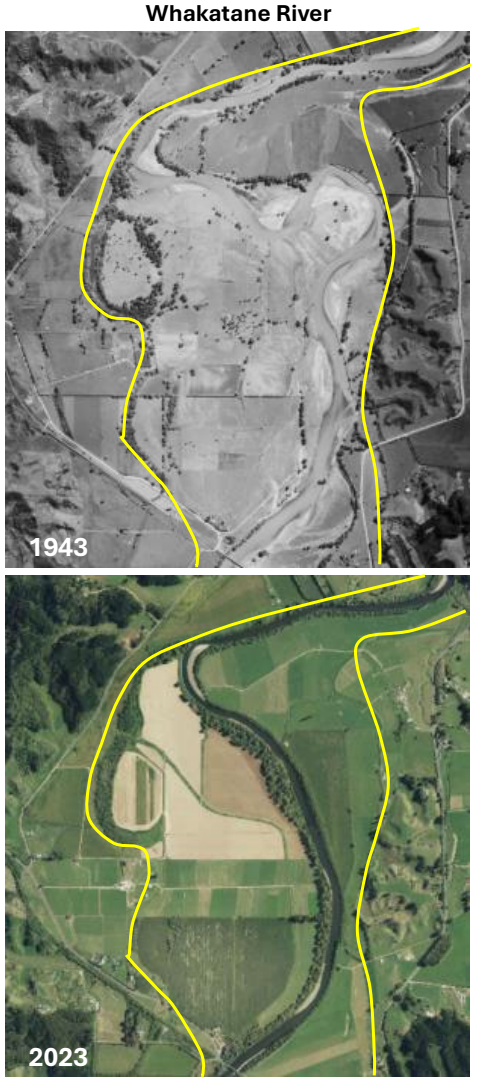
River management in NZ

River control works have been constructed on many lowland rivers across New Zealand, including over 5,000 km of stop banks. (Knight, 2016, Crawford-Flett et al., 2022)

The pattern of settlement has created different management issues for different rivers.

Aotearoa New Zealand has a:

- complex tectonic setting,
- physiographic variation,
- short and steep river catchments,
- short history of human impacts compared to elsewhere in the world.



Research Objectives

How does geomorphic history shape what is possible for 'room-to-move' management interventions in New Zealand and why?

- Where are rivers able to move in the landscape?
- What factors are influencing how the rivers are moving?
- How have the rivers adjusted through time, focussing on adjustment post European settlement?
- How much room do these rivers need to move under current conditions?
- How will they move into the future, taking account of climate change?

Use geomorphic history to determine restoration strategies that work with river process → This work will provide guidance for the uptake of 'room-to-move' practices in Aotearoa New Zealand.

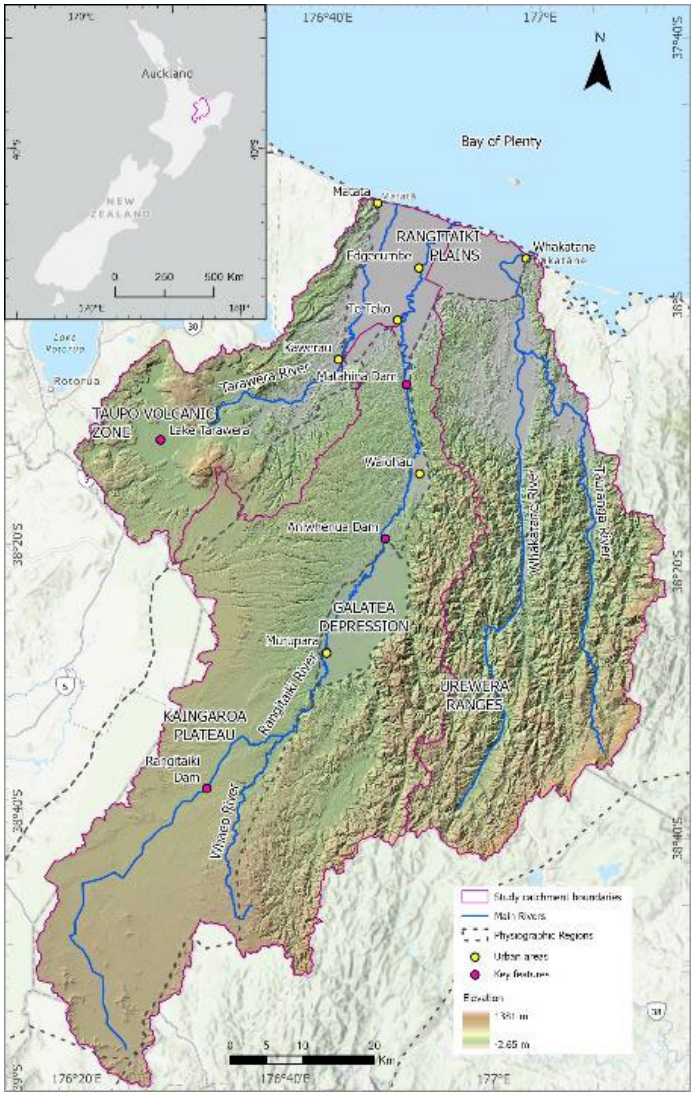
Note: This project explores the geomorphic aspects of the river system. It does not look at river health.

The Rivers of the Rangitāiki Plains

	Tarawera River	Rangitāiki River	Whakatane River
River length	65 km	155 km	112 km
Catchment area	984 km^2	3,005 km^2	1,540 km^2
Headwaters	Lake Tarawera	Kaingaroa Plateau	Urewera Range

What makes this area interesting?

- Three rivers with different geomorphic histories
- Over 100 years of anthropogenic modifications
- History of flooding and reliance on flood protection scheme.



The Rivers of the Rangitāiki Plains

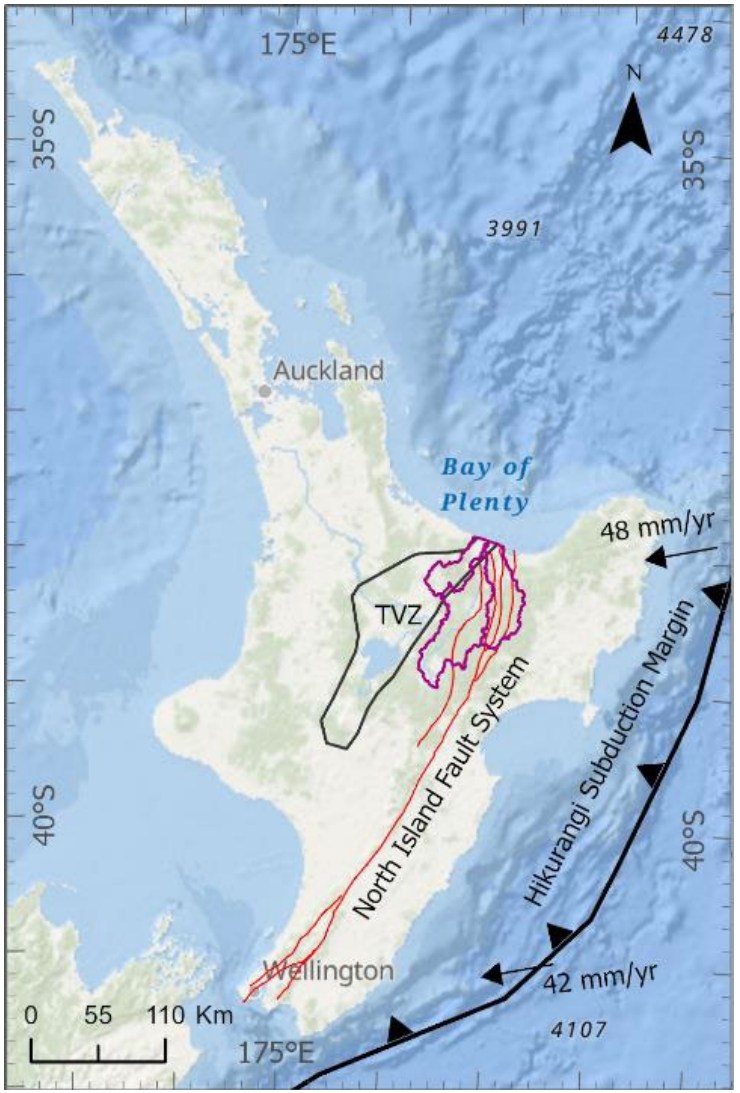
Geological Time – Millions of Years

Tectonic forces
The region has been shaped by the tectonic forces occurring at the subduction margin. The plate boundary developed its current configuration about 5 millions years ago to create the Taupō Volcanic Zone (TVZ)

The Rangitāiki Plains are being pulled apart to form rift zone at a rate of approximately 20 mm per year at the coast. Subsidence is estimated at 3 mm per year.

The Urewera Range is being uplifted at up to 4 mm per year.

In association with the subduction margin, volcanic eruptions from the TVZ have deposited thick volcanic deposits on the landscape which began approximately 2 million years ago.



The Rivers of the Rangitāiki Plains

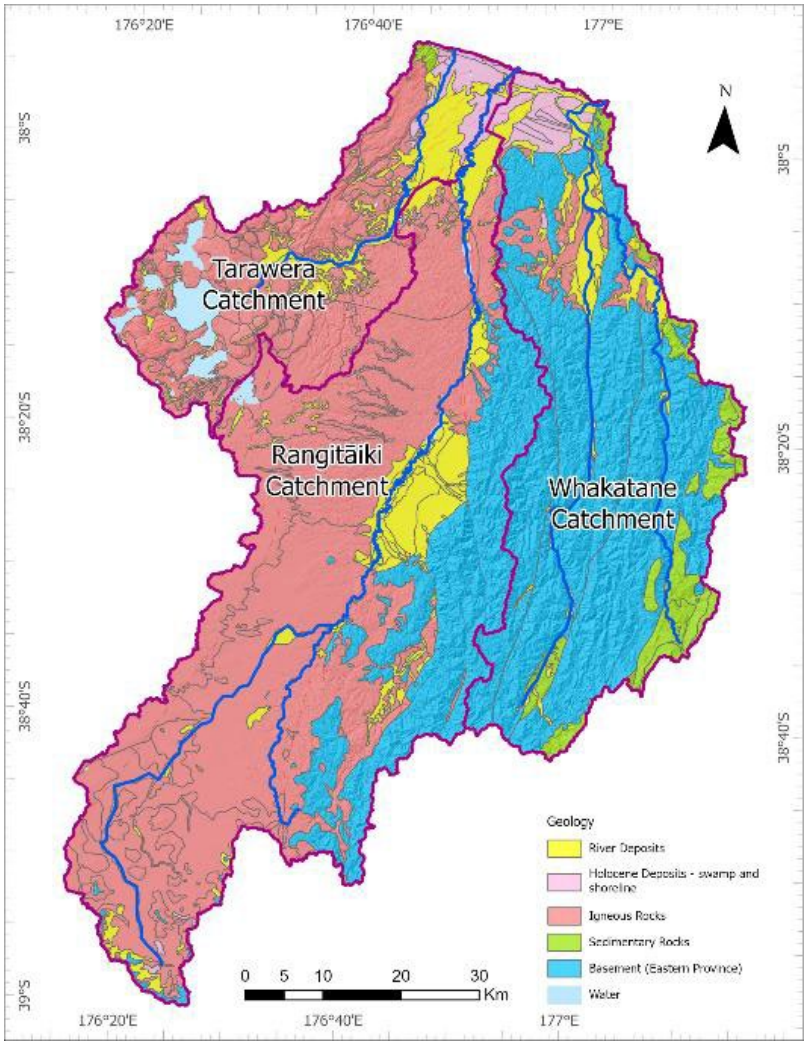
Geological Time – Millions of Years

Different types of rock in different areas.

- Greywacke (hard sandstone and mudstone)
- Volcanic ignimbrite

Geological Disturbance Events - Sudden and infrequent

- Volcanic Eruptions (Taupō 232AD and Tarawera 1886)
- Earthquakes (Edgecumbe, 1987)
- Catastrophic breakout floods from Lake Tarawera



The Rivers of the Rangitāiki Plains

Geomorphic Time – Thousands to 10's of thousands of years

- Changing climate - glacial to interglacial cycles
- Changes in sea level

Climate fluctuations change the flow and sediment regimes and alter vegetation

- Long term movement of the river on the valley floor
- Where is sediment stored on the valley floor

Terrace in Galatea Basin

The Rivers of the Rangitāiki Plains

Engineering Time – Decades to Centuries

How is the river adjusting and how frequently is sediment reworked:

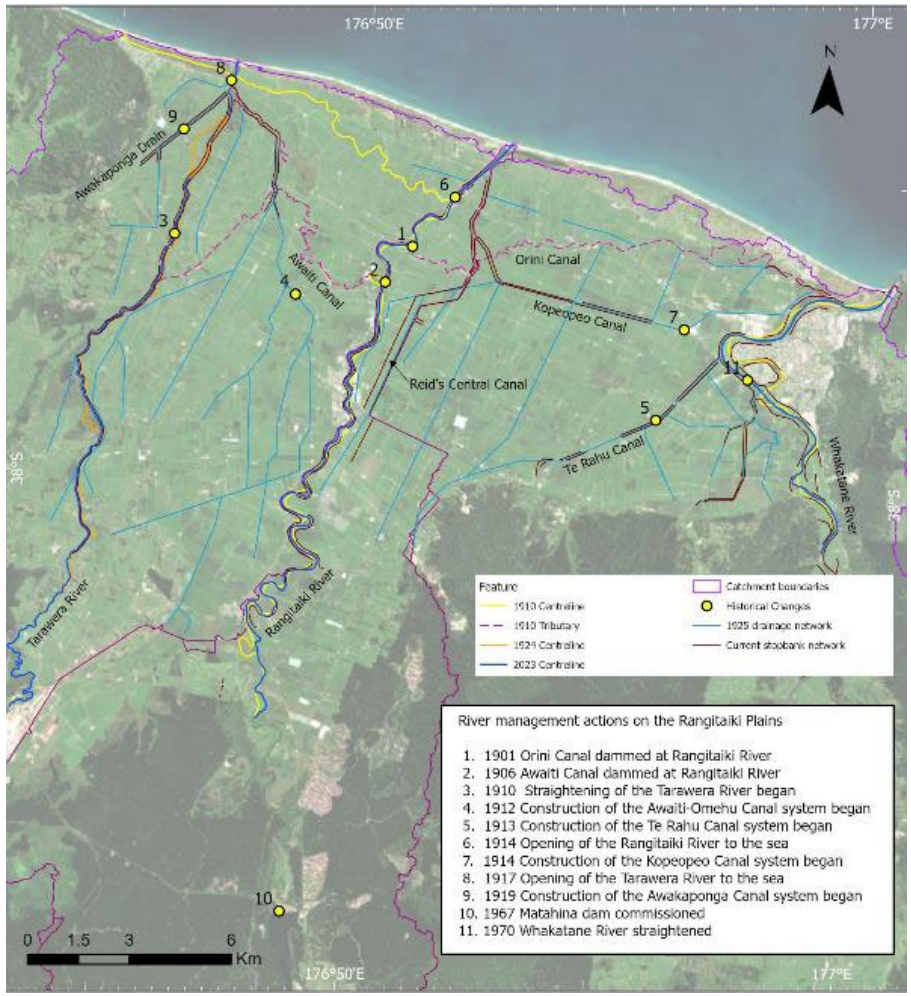
- Erosion and deposition of sediment
- Flood frequency and levels
- Human modifications and effects on the river

Disturbance Events

- Flooding following storm events

River Management on the Rangitāiki Plains

- 1891 – European settlement of the Plains
- 1900 - 1920 – Construction of canal system
- 1914 – Rangitāiki River cut, opening river to the sea
- 1917 – Tarawera River cut, opening river to the sea
- 1967 – Matahina dam commissioned
- 1971 – Construction of flood defences
- 1981 – Aniwhenua dam commissioned

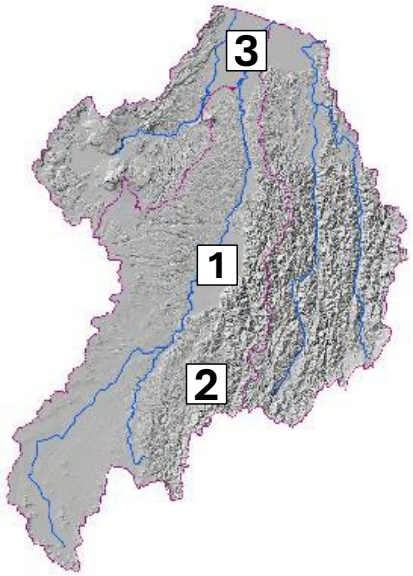


Part 1 – Diversity of the Rivers

What type of rivers do we have and where?

- How do they move in the landscape?
- What type of sediment is moving through the system?
- What is the pattern and connectivity of rivers?

A combination of field verification and remote sensing data.
Sediment sampling for grain size.



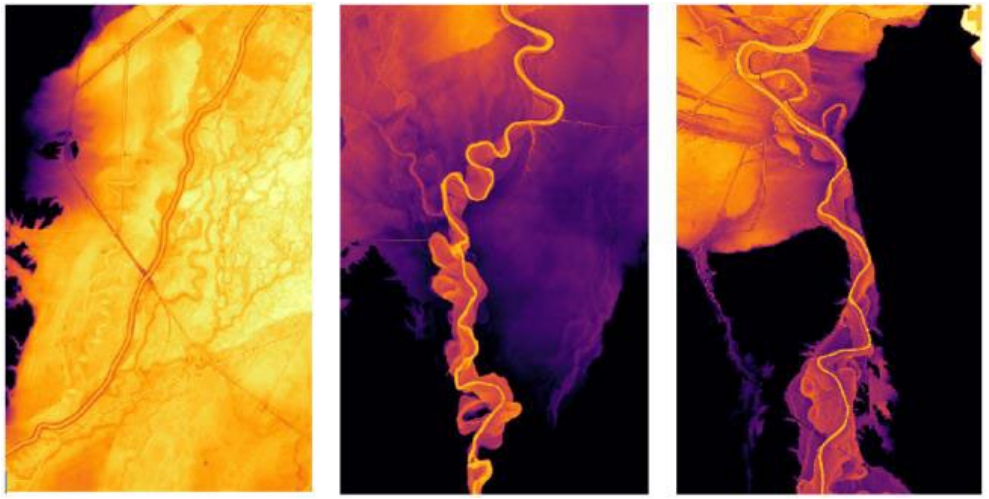
Part 2 – How the rivers have moved through time

Use imagery to look at where the rivers moved in the past.

- Aerial photographs
- LiDAR imagery analysis

Explain how different events and activities have shaped how the rivers move in the landscape today.

- Geological events
- Floods
- Human impacts

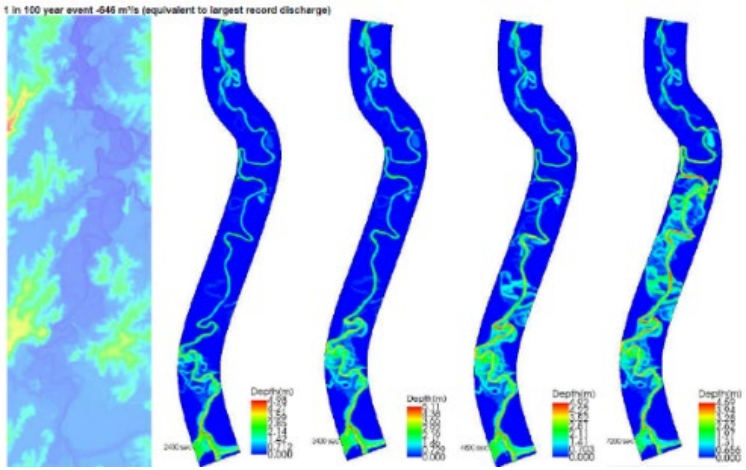


Relative Elevation Models of the Plains, a visualisation technique from LiDAR imagery which shows past channel locations.

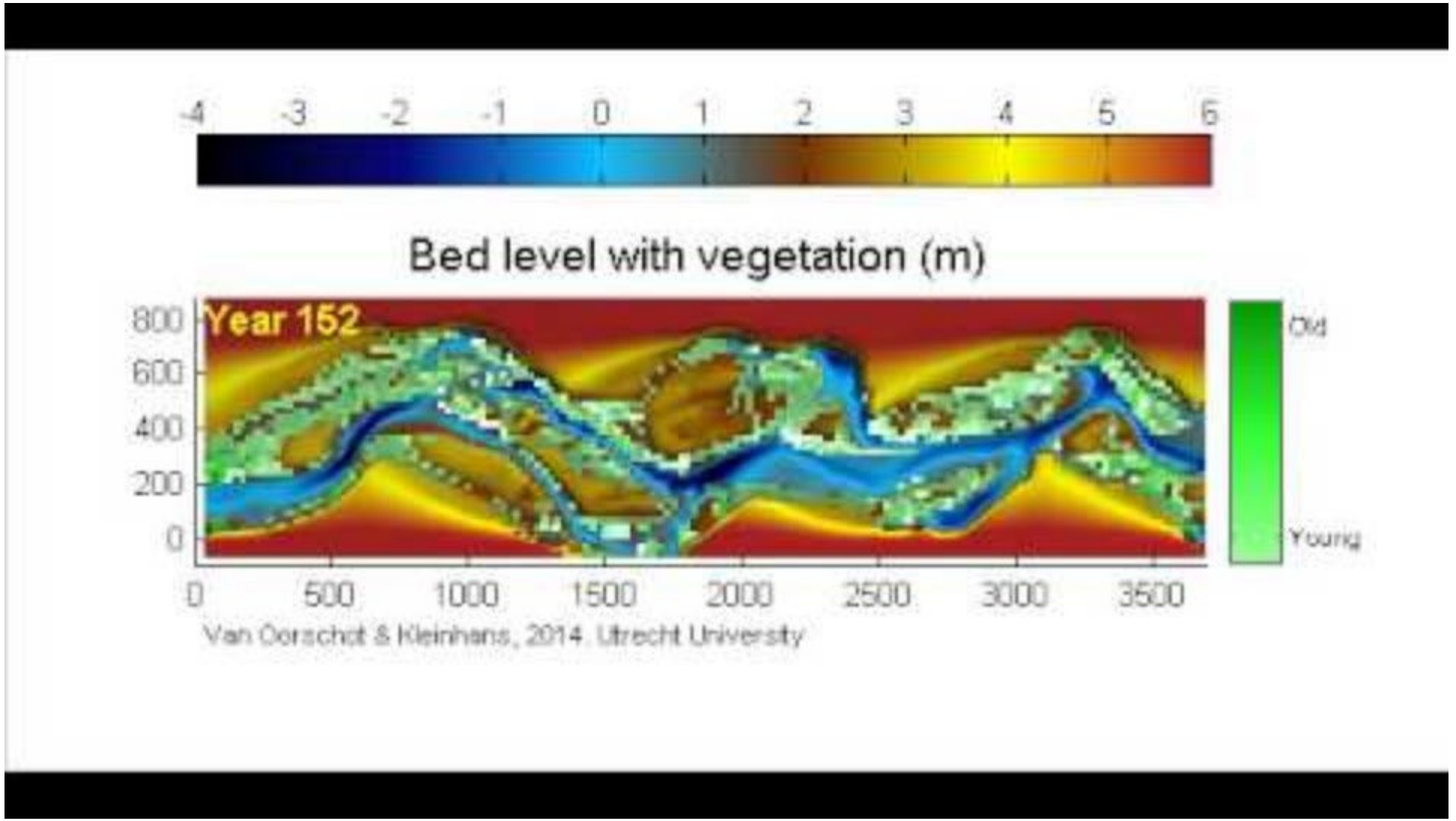
Part 3 – Potential River Futures

Use the geomorphic history to inform how these rivers could move in the future, taking account of climate change.

Use the evolutionary insights to look at the effect of ‘Room-to-Move’ and natural flood management programmes.



Example of meander evolution modelling using Meander JP and flood modelling using Nays2DH by iRIC


-4 -3 -2 -1 0 1 2 3 4 5 6
Bed level with vegetation (m)
Year 152
800
600
400
200
0
0 500 1000 1500 2000 2500 3000 3500
Old
Young
Van Oorschot & Kleinhans, 2014. Utrecht University

Geomorphic River Stories (Fuller et al, 2023)

Rangitāiki River

River sediment comes from ignimbrite and greywacke creating variable material in the streams and variability between tributaries and the main stem.

Adjustment	Variable adjustment potential in sand and gravel reaches.
	Terraces and fans in Galatea and Waiohau basins limit adjustment.
	Rivers entrenching into plateau.
Connectivity & Sediment Source	Hillslopes and terraces in the Galatea and Waiohau basins are acting as buffers, preventing direct sediment input from hillslopes to stream.
	The strength of the ignimbrite is variable and can be weak with faster erosion rates, leading to comparably faster rates of bed and bank erosion in confined reaches.
Management Considerations	Anthropogenically modified longitudinal connectivity from dams.
	Lateral adjustment variable across the catchment as bed sediment changes.
	Stop banks on the Rangitāiki Plains alter lateral adjustment and flood regime.

Summary

Although located side by side, the Tarawera, Rangitāiki and Whakatane catchments have different geomorphic histories and therefore require different approaches to management.

- Understand the diversity and patterns of river so we can work with them.
- Working at a catchment scale to understand the relationships and connectivity of the system.
- Understand the cascading effects brought about by changes in the system over different timescales.

This will inform how much room a river needs to move based on its flow, sediment and roughness regime.

Thankyou

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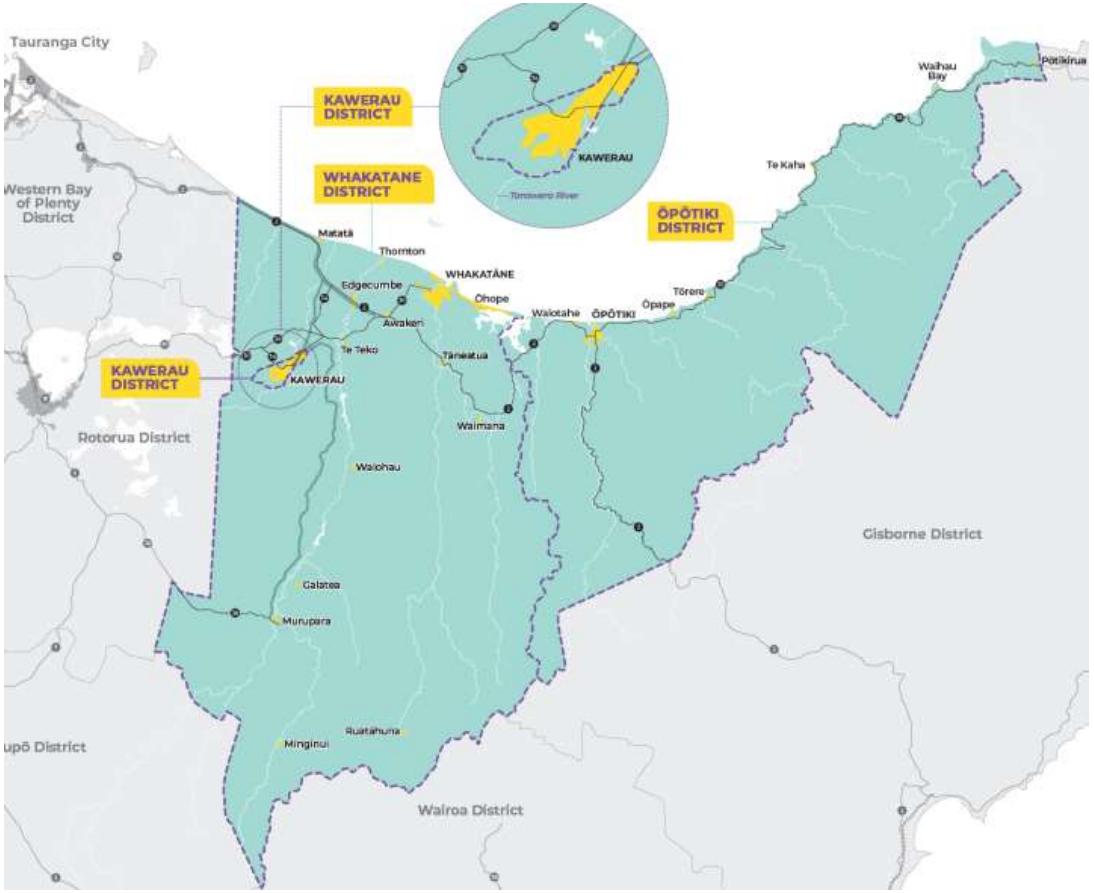
Our Places

Eastern Bay Spatial Plan

Rangitāiki River Forum, November 15, 2024

What we will cover

1. What is a spatial plan and why we need one
2. Key facts about the Eastern Bay
3. How can we meet the demand for residential and business land for the next 30 years?
4. Project timeline - next steps



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We are creating a plan to set a vision for the future of the Eastern Bay

Our Places will set out where the Eastern Bay wants to head and provide a roadmap, or spatial plan, for how to get there and help us focus our limited resources on the most important projects.

The plan is being developed by Councils, iwi partners, and supported by representatives from Central Government.

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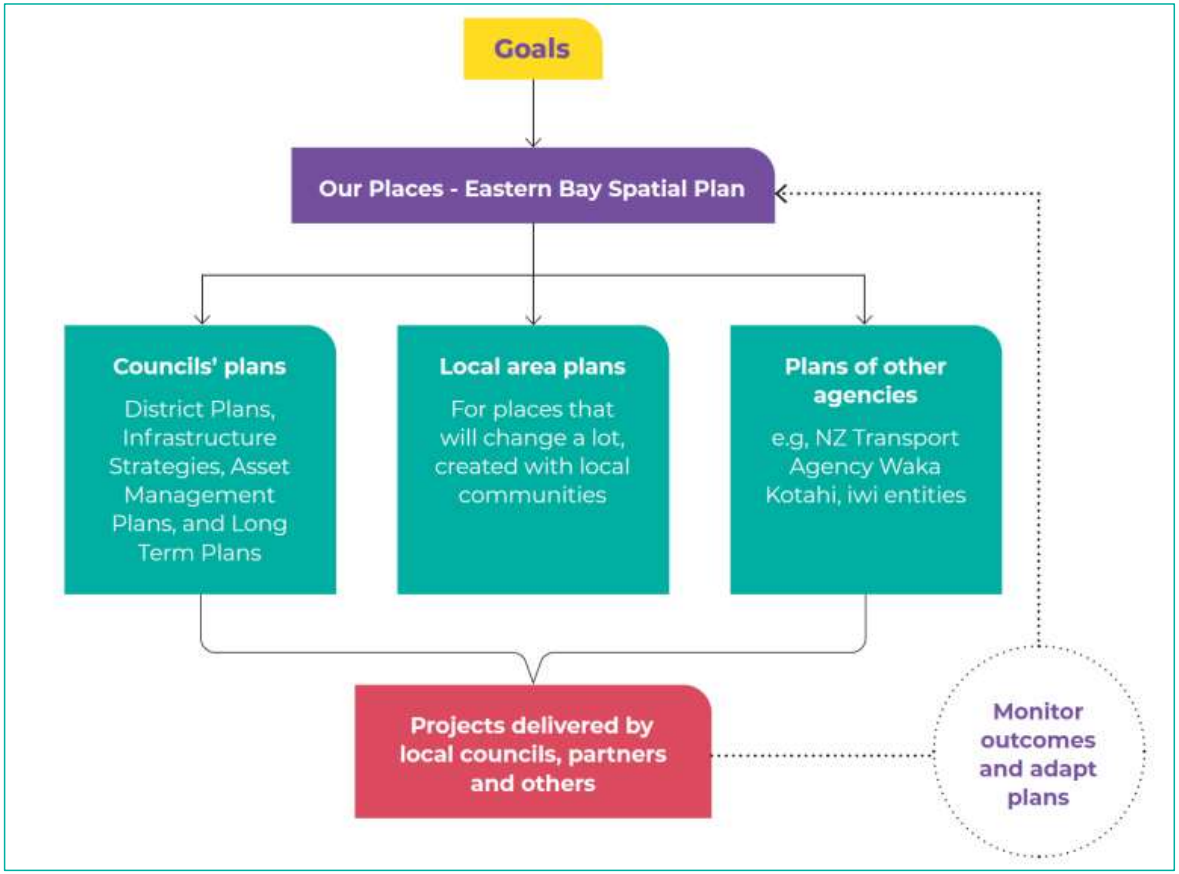
A spatial plan is about the economy, a changing climate, the environment, infrastructure, and how we – and future generations – want to live, work and play in the future Eastern Bay

13/11/2024

What we would like to work towards

13/11/2024

Delivering the plan, once it's ready



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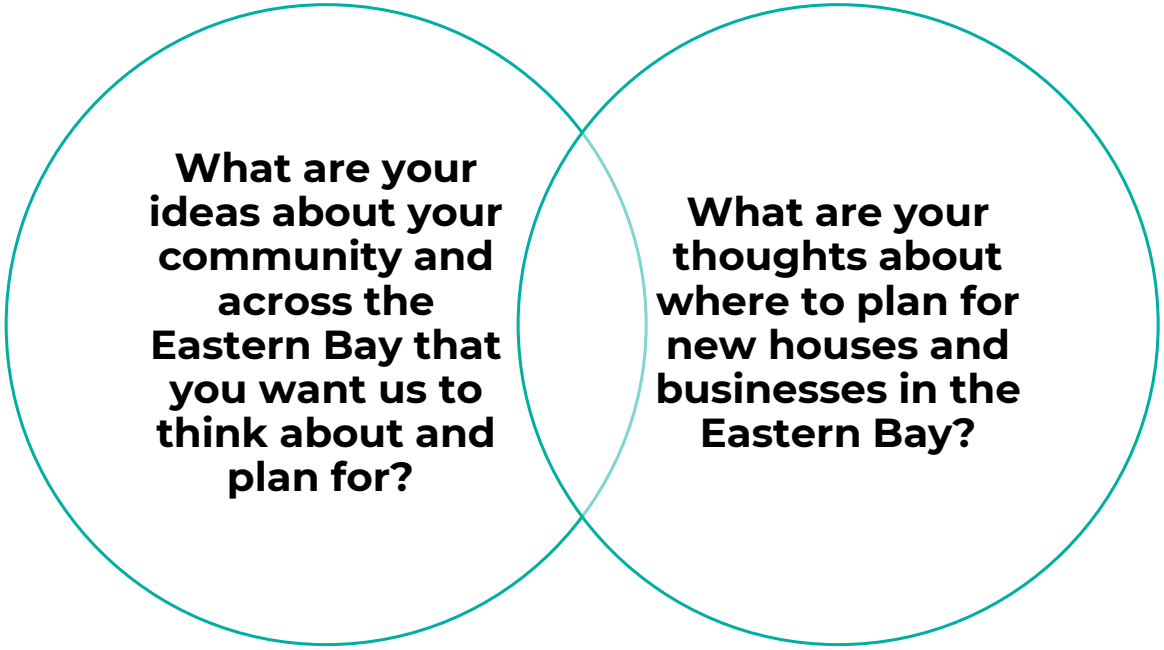
A chance to say how you want your grandchildren to experience the Eastern Bay



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Key facts about the Eastern Bay

In 2023, the Eastern Bay was home to about 57,000 people, and there were around 21,000 employees

Looking out to 2055, there will likely be around 12,000 more people living in the Eastern Bay, and there is likely to be 25,000 ‘employees’

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Growing older and younger

- Our population is ageing.
- 30% of us will be 65 years and older by 2055.
- In contrast, 52% of the population is Māori
- Roughly four out of ten people that identify as Māori are <20 years old.

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A diverse economy with growth opportunities

- Kawerau District, 37% of jobs are in manufacturing.
- Ōpōtiki District, 31% of jobs are in agriculture, forestry and fishing.
- Whakatāne District, jobs are diverse, primarily in agriculture, forestry, fishing, healthcare, training and education, and retail.

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Our Places is working with iwi to document aspirations and identify means to support these

- More than 50% of the Eastern Bay's population area are Māori.
- Iwi in the Eastern Bay are active local investors.
- With increasing economic activity, housing and business land to keep up with demand is essential to achieving economic aspirations.
- Our Places is working with iwi to document aspirations and identify means to support these.

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The Eastern Bay is one of the most constrained parts of the country because of natural hazards

Flooding from significant river systems, coastal processes, landslides and debris flows, tsunami, earthquakes, volcanic eruption and rising groundwater apply.

Climate change will make many of these worse.

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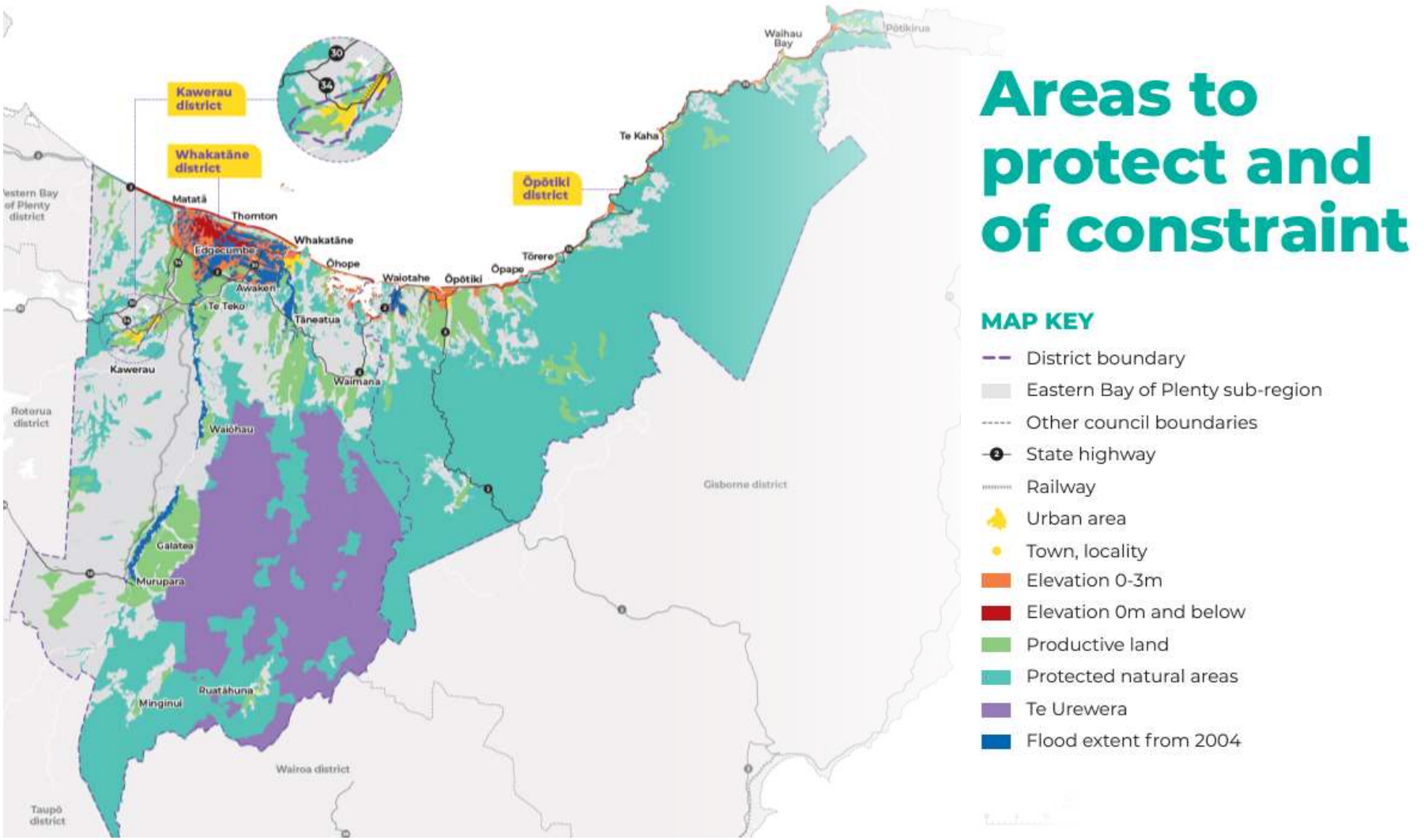
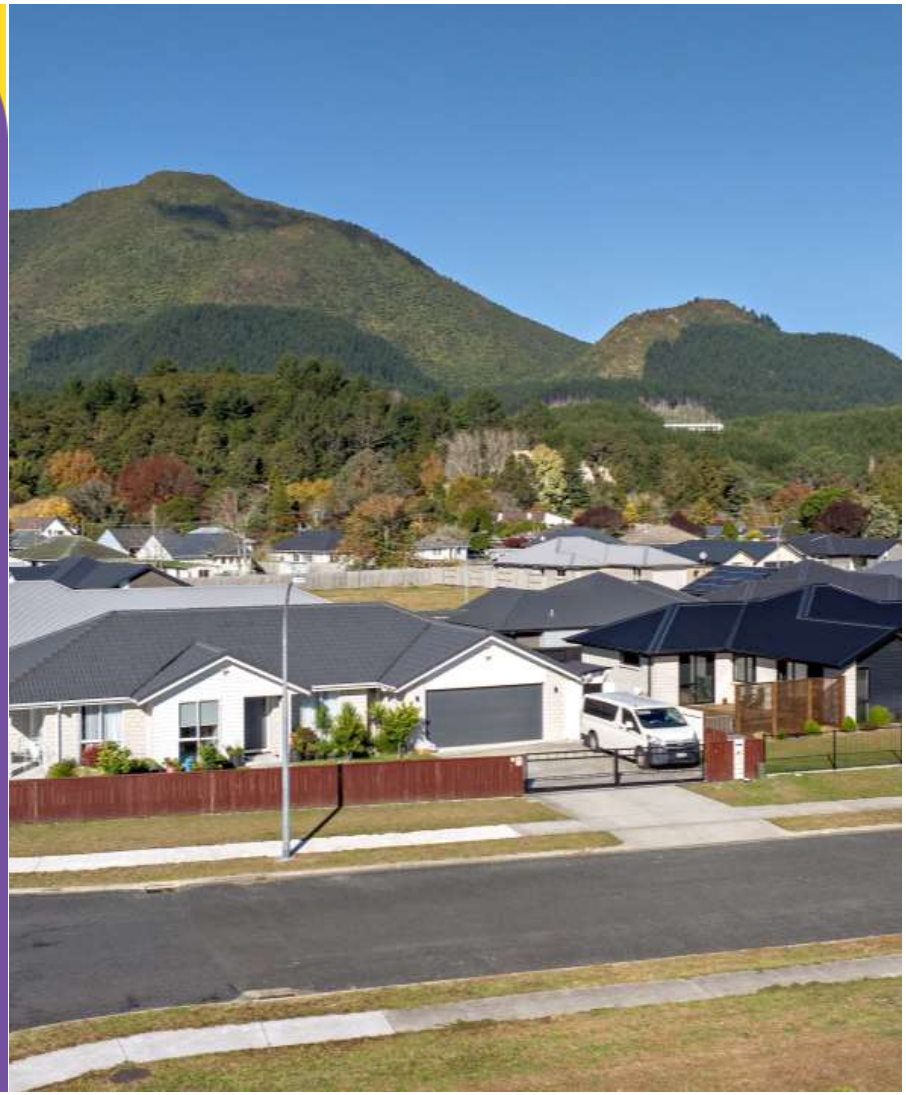

Kawerau district
Whakatāne district
Ōpōtiki district
Matatā
Thornton
Whakatāne
Edgecumbe
Ōhope
Awakeri
Te Teko
Waiotahe
Ōpōtiki
Ōpape
Tōrere
Te Kaha
Waihau Bay
Ōpōtikirua
Tāneatua
Waimana
Kawerau
Waiōhau
Galatea
Murupara
Ruatāhuna
Minginui
Gisborne district
Wairoa district
Rotorua district
Taupō district
Areas to protect and of constraint
MAP KEY
District boundary
Eastern Bay of Plenty sub-region
Other council boundaries
State highway
Railway
Urban area
Town, locality
Elevation 0-3m
Elevation 0m and below
Productive land
Protected natural areas
Te Urewera
Flood extent from 2004

How can we meet the demand for residential and business land for the next 30 years?

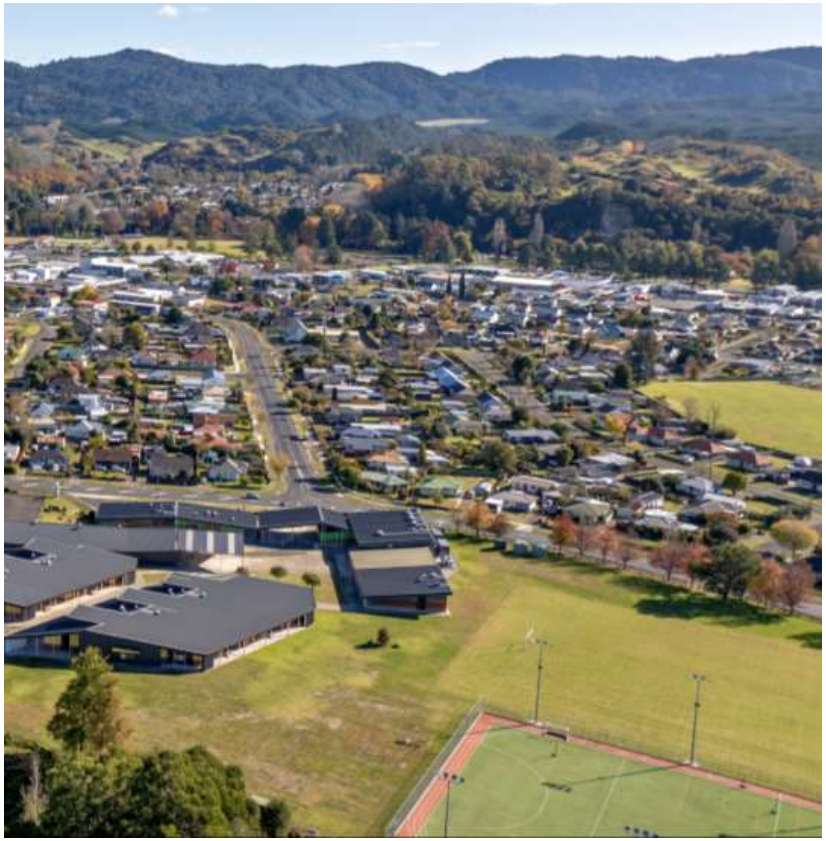


Currently we have a shortage of land to build new homes

By 2055, we need to plan for 5,500 more homes.

Around 4,000 in Whakatāne and Kawerau Districts, and the balance in Ōpōtiki District.

There is a need to look across the Eastern Bay for where we can put people and think about how this can unlock economic opportunities.



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Scenario 1

Resilient greenfield areas

Provide a long-term supply of housing and business land in a series of new greenfield areas: Matatā, Awakeri, Hukutaia.

There would be a low level of residential infill and a low level of rural residential development.

(Preferred option)

Scenario 2

Un-serviced rural residential focus

Enable demand for housing to shift into rural locations, with a relaxed regulatory approach (and avoiding highly productive land and areas prone to natural hazards).

There would be a high level of rural residential development. Over time this could encourage a high level of infill and intensification of townships and villages.

Scenario 3

Growth outside the sub-region

Demand shifts out of Whakatāne and Kawerau to Western Bay of Plenty and Rotorua because there are no new greenfield areas and rural residential development is not enabled.

There would be a low level of rural residential development. Over time this could encourage a high rate of intensification and infill of townships and villages because there are few other options for housing growth in the districts.

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Some things would be planned for in all scenarios

Papakāinga and Māori-led housing enabled to meet aspirations, with potential to become a much larger part of the housing mix.

Infill development within townships is not a large-scale source of housing supply due to natural hazard limitations and limited capacity.

Some places are expected to grow because these aspirations have been clearly expressed and some are already in various stages of planning.

- Stoneham Park, Kawerau
- Proposed Plan change 8 / Julians Berry Farm near Whakatane township
- Hukutaia development area near to Opotiki township
- Minginui, Murupara, Tāneatua, Matatā would see some additional development
- Putauaki Trust Industrial Zone growth
- Industrial activities around Ōpōtiki township, and east of Ōpōtiki township up the coast

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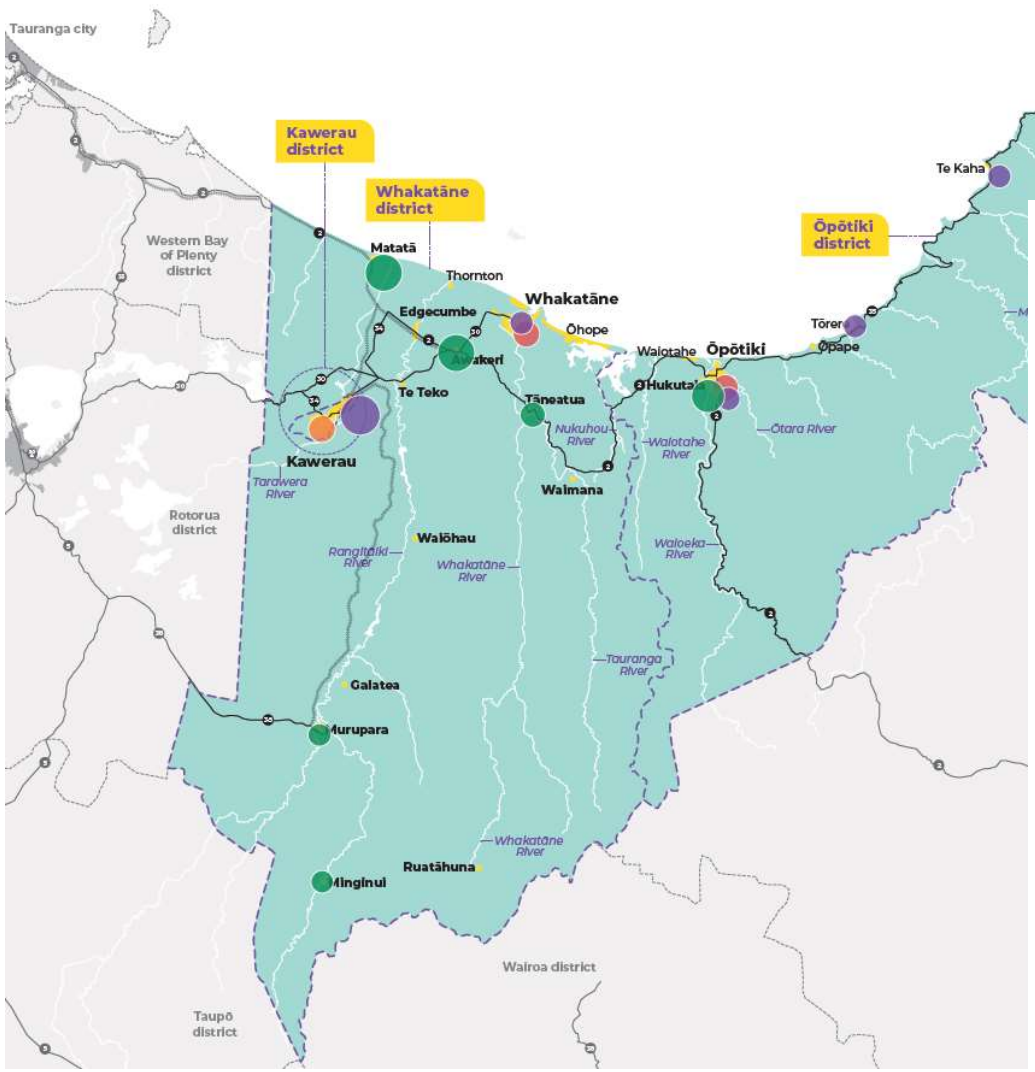
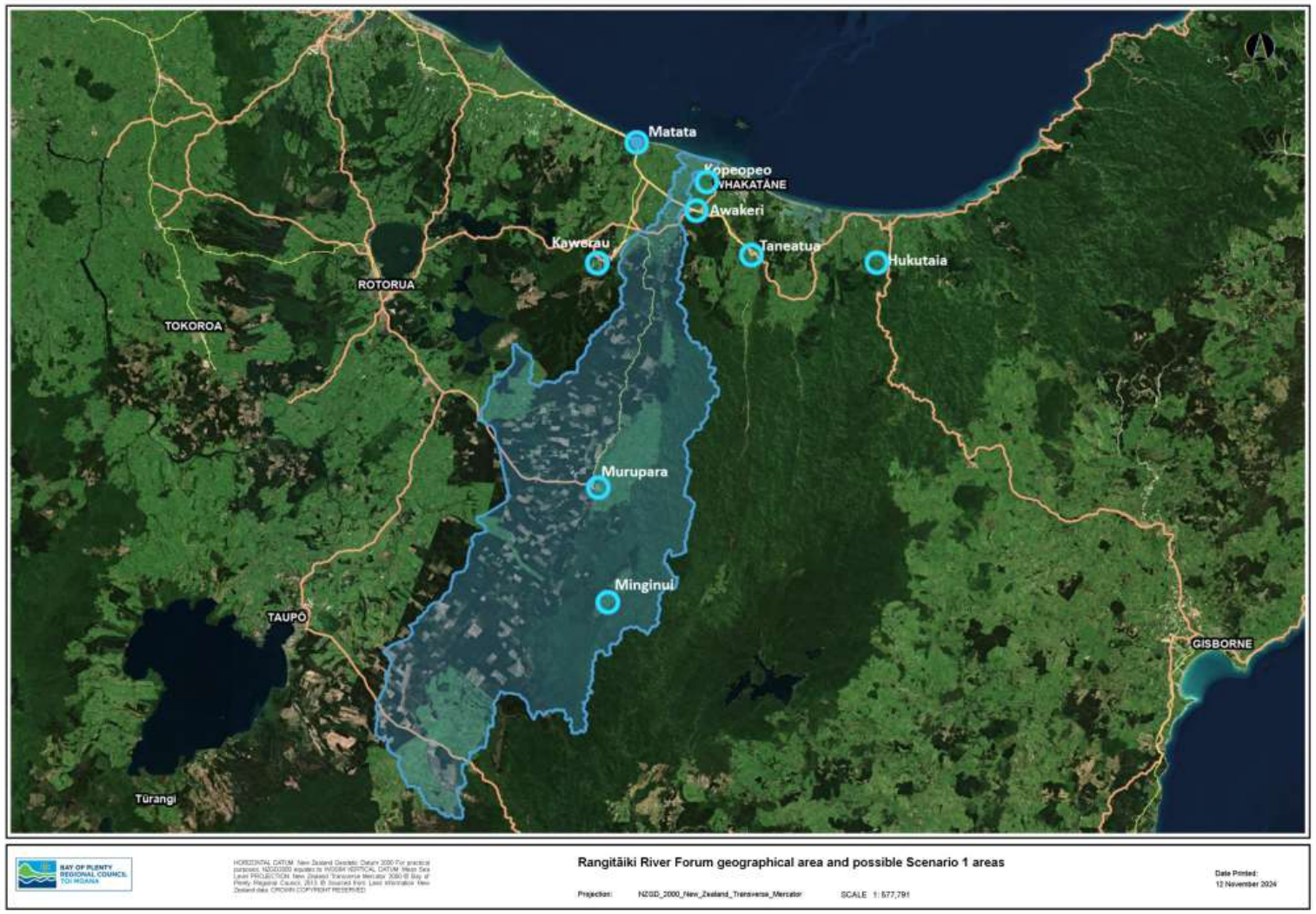


Main possible future development locations proposed in Scenario 1

MAP KEY

- District boundary
- Eastern Bay of Plenty sub-region
- Other council boundaries
- State highway
- Urban area
- Town, locality
- Greenfield residential land
- Residential infill (Whakatāne and Ōpōtiki), limited by natural hazard risks to appropriate locations and scale
- Residential infill (Kawerau)
- Industrial and business activity

Note: this map is conceptual and does not indicate specific land areas


Matata
Kopeopeo
WHAKATĀNE
Awakeri
Kawerau
Taneatua
Hukutaia
ROTORUA
TOKOROA
Murupara
Minginui
TAUPŌ
GISBORNE
Tūrangi
BAY OF PLENTY REGIONAL COUNCIL TOI MOANA
Rangitāiki River Forum geographical area and possible Scenario 1 areas
Projection: NZGD_2000_New_Zealand_Transverse_Mercator
SCALE 1:577,791
Date Printed: 12 November 2024

Project timeline

Feedback Open
- October 14, 2024

Feedback Closes
- November 17, 2024

Presentations to the Governance Group from the public
- December 02, 2024

Collate and review of all feedback
- End of 2024

Release the draft plan for final feedback
- Mid-2025

Final plan adopted by Councils, ready for action!
- Late 2025

13/11/2024

Ways to provide feedback

- We welcome any comments today, or...
- Online: visit ebopspatialplan.org.nz to drop a ‘pin’ on the map and leave comments.
- Complete a Survey Questionnaire – Hard Copy.
- In person: 2nd Dec Project Governance Group Hui. Email kiaora@ourplacesbop.org.nz by 5pm, 17 Nov to be involved.

13/11/2024


Pātai?

TIPU MĀTORO
Wallaby-free Aotearoa

Proposed Rangitāiki River Corridor/ Matahina Forest Aerial Wallaby Control

September 2024

Davor Bejakovich, NI Wallaby Programme Leader
Dave Byers, Senior Biosecurity Officer WRC
Dale Williams, Biosecurity Officer BOPRC
Kathryn O'Toole, Pest Animals Lead WRC

North Island Wallaby Eradication Programme

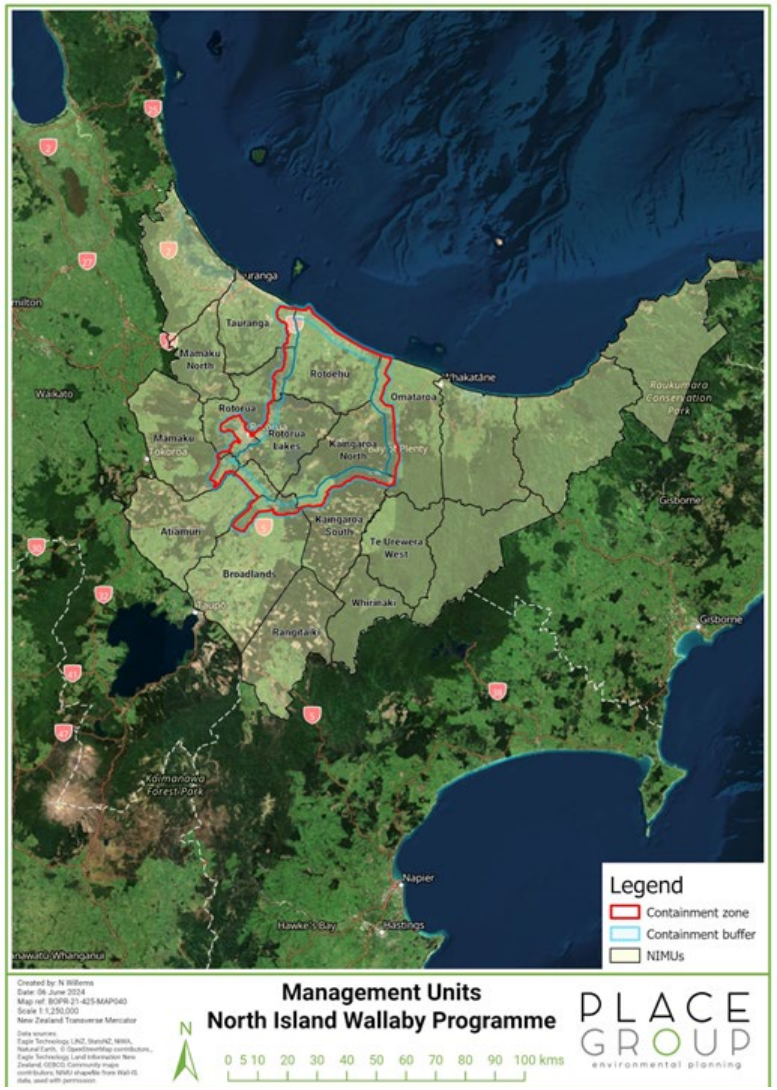
The programme's management objective is to stop the spread, achieve containment, and then eradicate wallaby from the North Island.

Priorities as in the North Island Operational Plan:

- Priority 1: Control/eradication of known wallaby populations outside of the Containment
- Priority 2: Surveillance to identify additional wallaby populations outside the Containment
- Priority 3: Interventions to prevent outward dispersal of wallabies from the Containment
- Priority 4: Minimising risk of wallabies within the Containment Area from invading areas that are currently wallaby-free

TIPU MĀTORO
Wallaby-free Aotearoa

Containment Area Map



TIPU MĀTORO
Wallaby-free Aotearoa

3

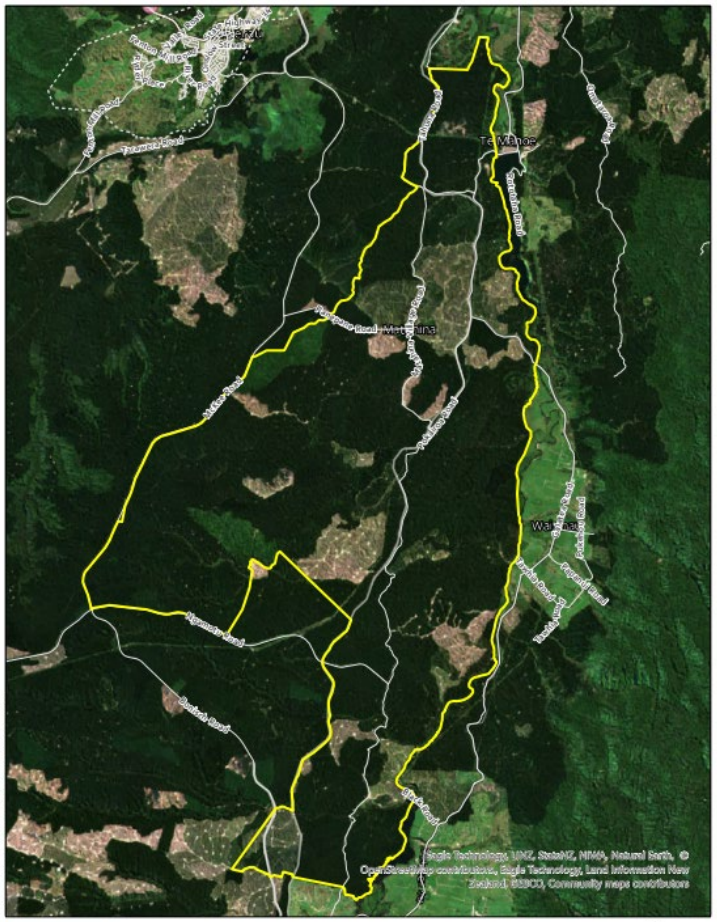
Wallaby control 2024/25 – Proposed Matahina Forest Aerial Operation

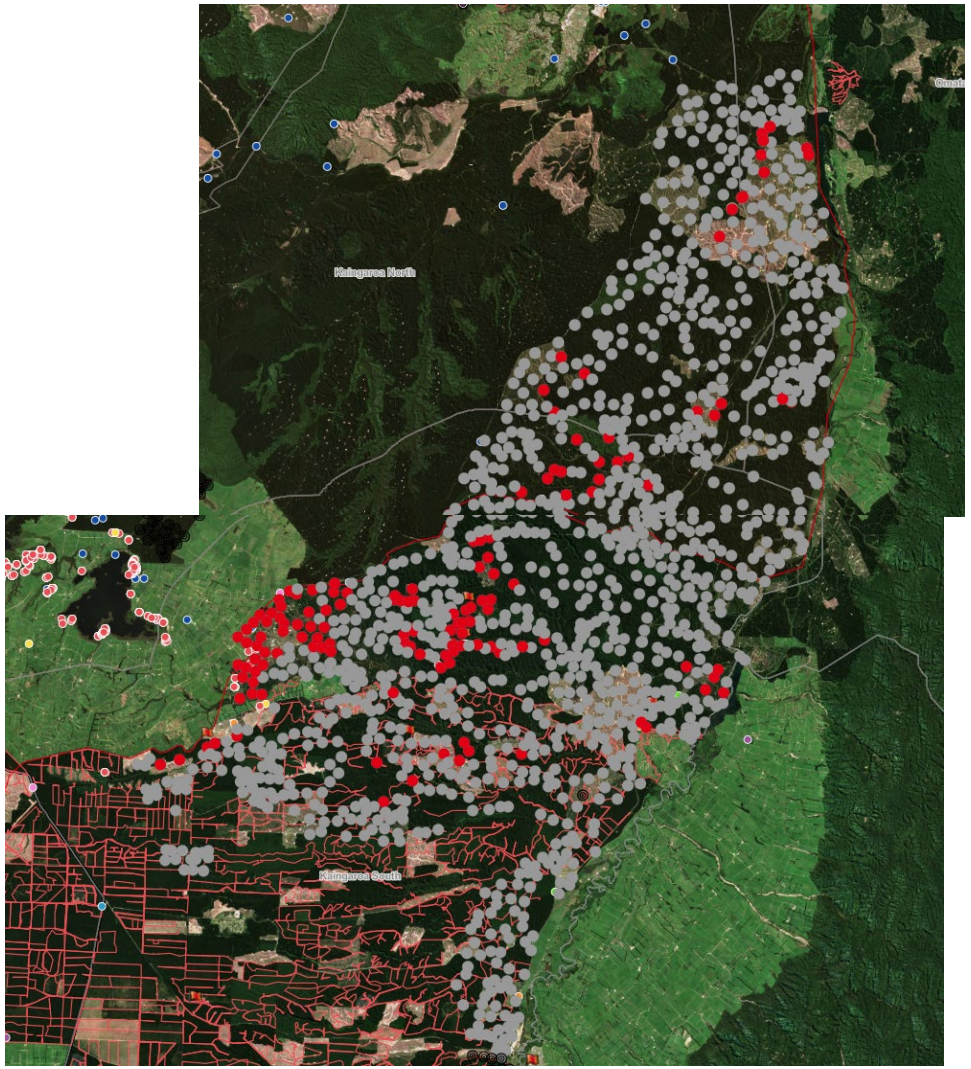
- Stop eastward spread of wallaby over the Rangitāiki River
- Boundary defined by camera and dog surveillance, and public sightings
- 1080 is the only landscape scale tool available for wallaby control

TIPU MĀTORO
Wallaby-free Aotearoa

Matahina Forest

- 18,000ha
- Jun July 2025





Wallaby control 2024/25 – Proposed Matahina Forest Aerial Operation, Operational Monitoring

- Pre and post operation monitoring (cameras)
- Identify any surviving wallaby in operational area – follow up control
- Future control move northwest towards the Containment boundary
- Coordinate control with Timberlands and their planned pest control
- Also, camera and dog surveillance over the crossing points (Matahina, Galatea, Kopuriki, Murupara)

TIPU MĀTORO
Wallaby-free Aotearoa

Site	Bait type	Treatment Area (hectares)	Date	Wallaby reduction	Forest Type
Rocky Cutting Road, Welcome Bay Tauranga*	Ground Feratox strikers	40 ha	Aug 2013	86.4%	Radiata pine plantation
Rotoehu Forest	**Aerial 1080 Cereal bait**	2,578 ha	Sept 2017	**96.9%**	Native forest
Ngongotaha stream headwaters – (Ray Fleming's) *	Ground Feratox strikers	51 ha	Oct 2018	69.8%	Native forest
Waerenga*	Ground Feratox strikers Feratox in bait stations	100 ha 600 ha	Jun 2019 2023/24	70% approx. 70%	Mix of native forest and radiata pine plantation
Paehinahina-Mourea, south of Lake Rotoiti	Night shooting then ground Feratox strikers	681 ha	Winter 2019	71%	Mix of native forest and radiata pine plantation
Horohoro, Mamaku Plateau	**Aerial 1080 Cereal bait**	5,482 ha	Nov 2020	**96.9%**	Mix of native forest and radiata pine plantation
Kaiwhatawhata Road	**Aerial 1080 orange lured carrot**	711 ha	June 2020	**100%**	Radiata pine plantation
Waipupumahana*	Ground Feratox strikers	195 ha	Winter 2020	78.5%	Native forest
Kaingaroa South – Waiotapu, south of Maunga Kakaramea	**Aerial 1080 Carrot bait**	11,159 ha	Aug 2023	**97%**	Radiata pine plantation
Rotoehu Forest,	**Aerial 1080 Cereal bait**	2,578 ha	Sept 2023	**100%**	Native forest

TIPU MĀTORO
Wallaby-free Aotearoa