



Forest & Bird  
TE REO O TE TAIAO | Giving Nature a Voice

CELEBRATING  
**100**  
YEARS 1923-2023

# MAKING ROOM

# FOR RIVERS

**TUKUA NGĀ AWA  
KIA RERE**

Tom Kay

[t.kay@forestandbird.org.nz](mailto:t.kay@forestandbird.org.nz)

# River flow for Tutaekuri River at Puketapu HBRC Site

Custom Date Range: 13-02-2023 to 15-02-2023

14 Days

30 Days

All

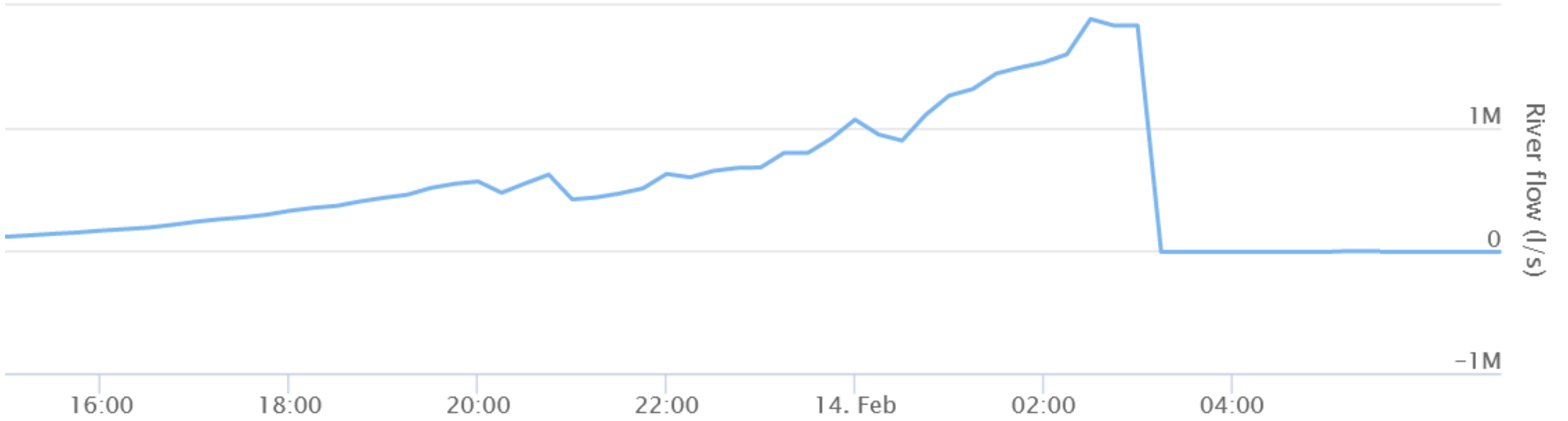




Photo: Steve Dighton



Tutaekuri River

Cyclone Gabrielle

Photo: Steve Dighton



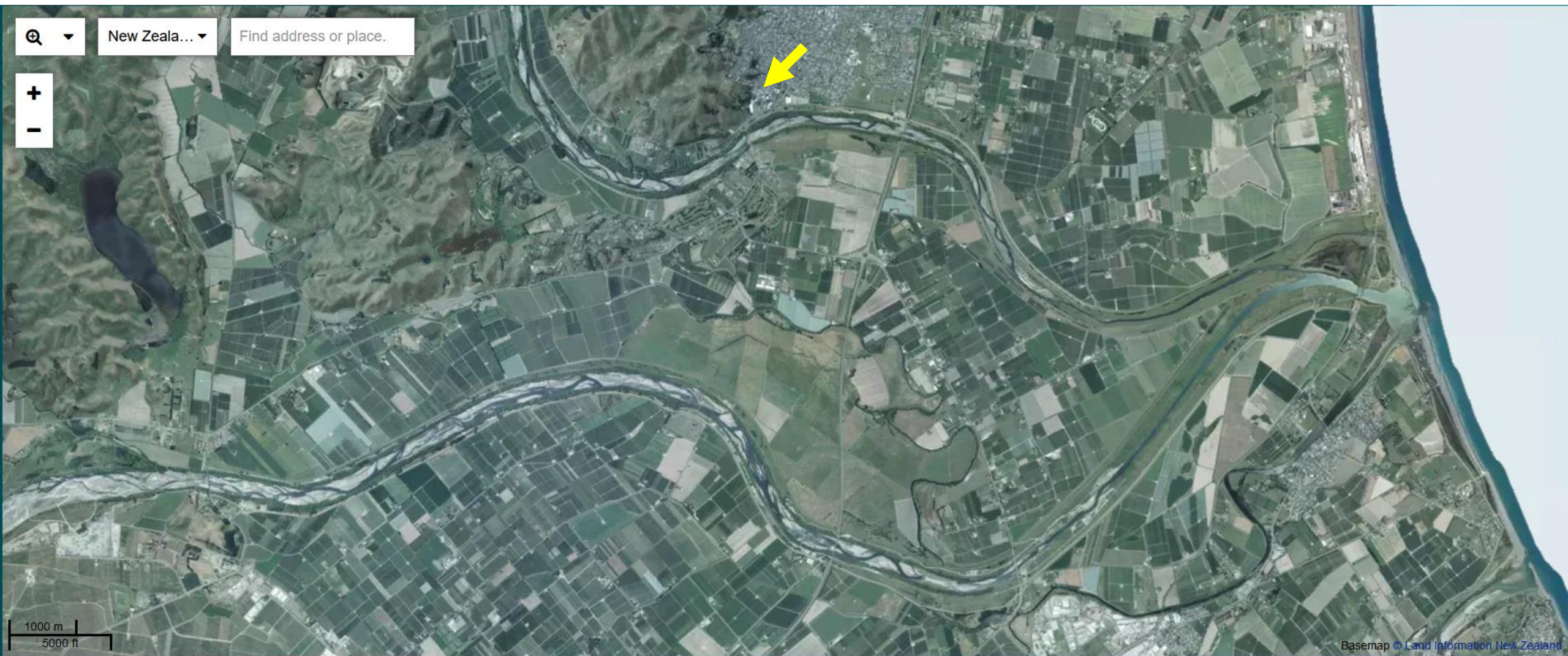


Image: Tom Kay  
Tutaekurī River, Redclyffe Bridge

Image: Tom Kay  
Puketapu/Dartmoor  
Rd area



# Pre-Cyclone Gabrielle





# Post-Cyclone Gabrielle







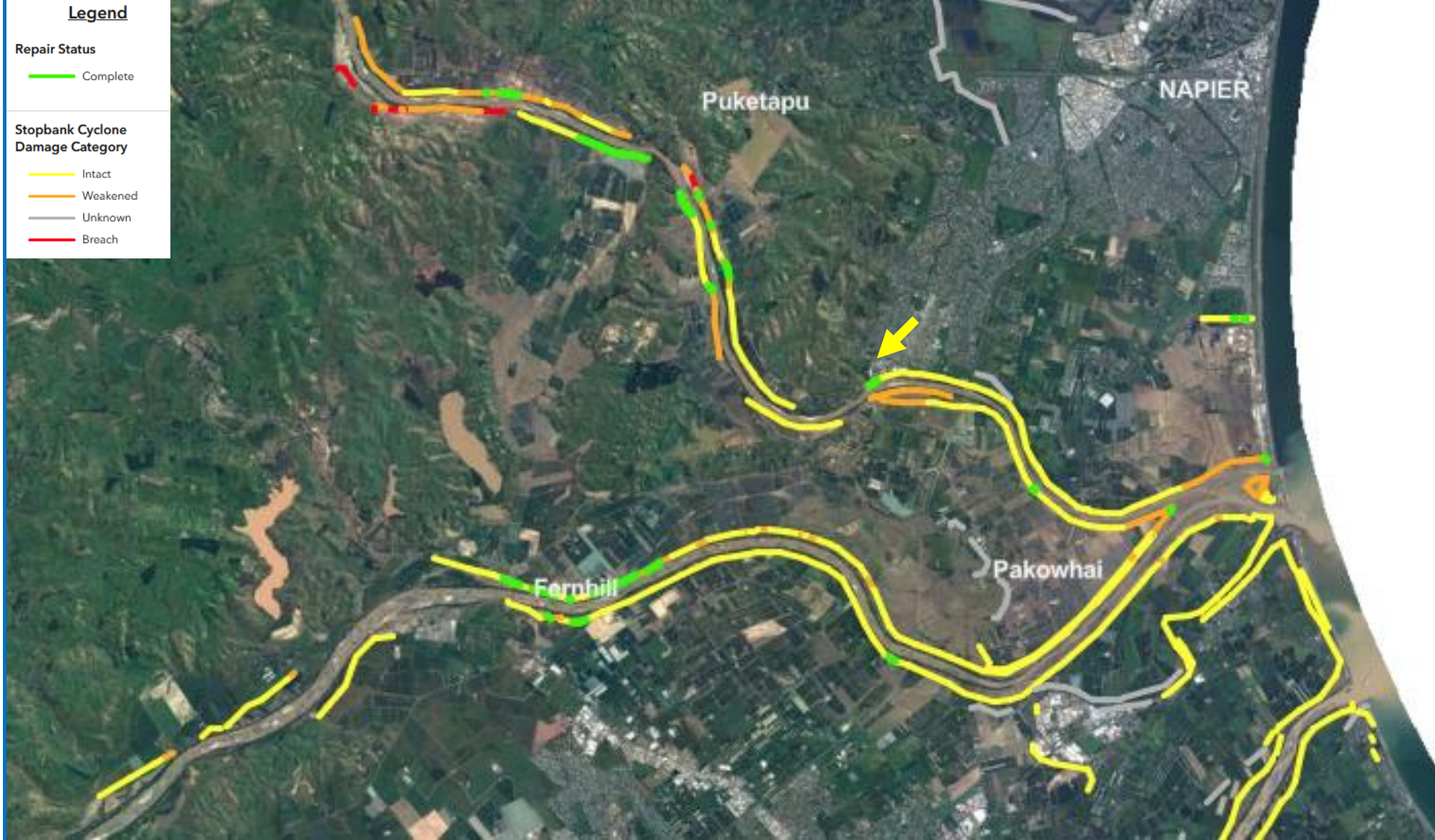
## Legend

### Repair Status

 Complete

### Stopbank Cyclone Damage Category

 Intact  
 Weakened  
 Unknown  
 Breach

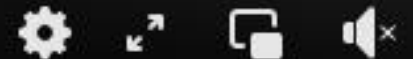



HB Civil Defence Emergency  
Management Group

[https://www.facebook.com/  
hbemergency/videos](https://www.facebook.com/hbemergency/videos)



▶ 0:08 / 1:07



 Extreme courage, skill and hope on display here! Thank you to Trevor for providing this incredible footage of a daring rescue at Gilligan Road today. Our first responders and partner agencies have been working tirelessly - thank you for what...



# Ngaruroro River at Omahu (pre-Cyclone Gabrielle)



# Ngaruroro River at Omahu (post-Cyclone Gabrielle)



# Pre-Cyclone Gabrielle



# Post-Cyclone Gabrielle







# Pre-Cyclone Gabrielle



# Post-Cyclone Gabrielle

200 m  
1000 ft

Basemap © Mapbox © OpenStreetMap contributors



# **Te Tai Rāwhiti / Hawke's Bay hillsides, post-Cyclone Gabrielle**



# Tāmaki Makaurau / Auckland





# Whakatū / Nelson

2022 - Stuff.co.nz  
<https://www.stuff.co.nz/environment/climate-news/129669205/liquefaction-threat-final-straw-for-libraris-river-site-climate-group-says>

NEW ZEALAND

# Te Tairāwhiti roads to re-open after flooding

10:42 am on 2 April 2022

Share this



Main roads in Te Tairāwhiti are being re-opened with restrictions after being damaged by severe rain.



A section of the bridge in Tokomaru Bay has been wiped out by flood water, bisecting the town alongside State Highway 35 Photo: RNZ / Angus Dreaver

<https://www.rnz.co.nz/news/national/464492/te-tairawhiti-roads-to-re-open-after-flooding>

# Westport flood: 450 homes still unlivable or damaged

11:34 am on 14 October 2021

Share this     

**Samantha Gee**, Nelson Marlborough reporter  
✉ [samantha.gee@rnz.co.nz](mailto:samantha.gee@rnz.co.nz)

Almost three months after floodwaters ravaged the coastal town of Westport, 140 people remain in temporary accommodation, living in cabins, motels or with friends and family.



A partly-submerged car outside flooded houses on Disraeli St, Westport. Photo: Supplied/NZ Defence Force

<https://www.rnz.co.nz/news/national/453511/westport-flood-450-homes-still-unlivable-or-damaged>





May 30, 2021 11:06:48 AM

Taken by:  
ECan (Verity Kirstein)

North Branch Ashburton  
River looking upstream  
(Shearers Rd N in bottom  
right of image)

Record ID: C21C/154734

Comments: Time Recorded  
by Camera Clock (May have  
been corrected)

# Ashburton/ Hakaterere

Licensed for use under  
Creative Commons 3.0  
by Environment  
Canterbury  
[https://apps.canterbury  
maps.govt.nz/FIR](https://apps.canterburymaps.govt.nz/FIR)

# Timaru District floods: Rangitata residents told to evacuate

1:31 pm on 10 December 2019

Share this     

The Timaru District Council has extended its evacuation area around the Rangitata river and is urging people to leave before it is too late.



Photo: Facebook / Timaru District Council

<https://www.rnz.co.nz/news/national/405178/timaru-district-floods-rangitata-residents-told-to-evacuate>



# Edgcumbe

2017 - Sky View Photography NZ

**“I have no doubt whatsoever in my mind, across my experience of my life as a climate scientist, that climate change has influenced that event.”**

Dr Sam Dean (NIWA principal climate scientist) after Cyclone Gabrielle

**“[These events] will become more severe as the planet continues to warm. That will mean... heavier rain, and more problems from... flooding.”**

MetService

<https://blog.metservice.com/TropicalCycloneGabrielleSummary>

# NIWA says 11 places recorded more than a year worth of rain already

7:55 pm on 6 July 2023

Share this     

The 11 locations that recorded over a year's worth of rain in the first six months of 2023:

- Kaikohe (2140mm)
- Whangārei (1526mm)
- Warkworth (1525mm)
- Leigh (1234mm)
- Whangaparāoa (1114mm)
- Albany/North Shore (1319mm)
- Māngere (1152mm)
- Tauranga (1335mm)
- Gisborne (1230mm)
- Tūtira (1359mm)
- Napier (984mm)

## NATURE'S DOWNPOUR 6 MONTHS, 1 YEAR OF RAIN!

THESE AREAS  
RECORDED OVER A  
YEAR'S WORTH OF  
RAIN IN JUST THE  
FIRST SIX MONTHS

KAIKOHE  
WHANGĀREI  
WARKWORTH  
LEIGH  
WHANGAPARĀOA  
ALBANY/NORTH SHORE

MĀNGERE  
TAURANGA  
GISBORNE  
TŪTIRA  
NAPIER

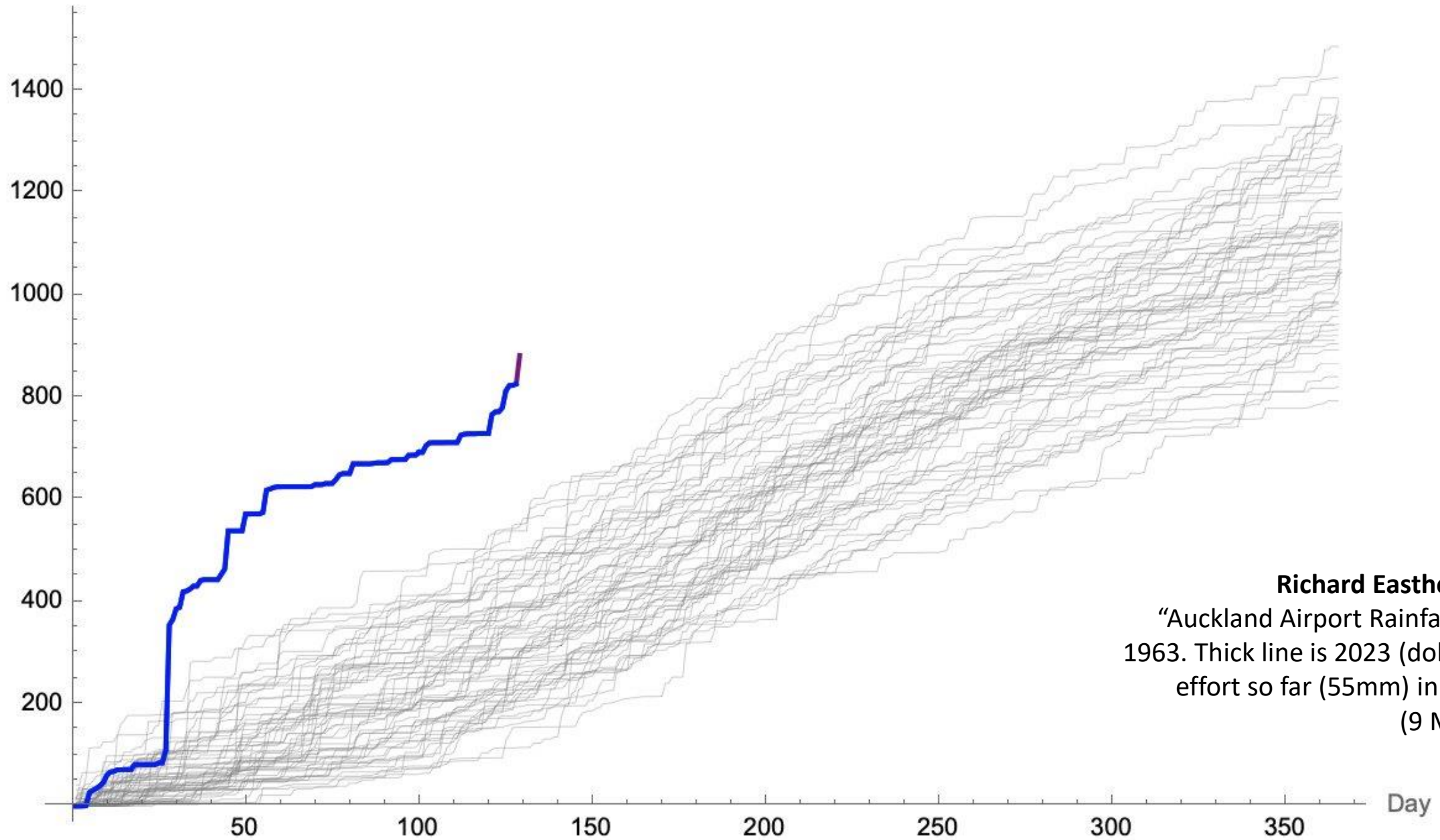
### DO YOU LIVE IN AN AREA THAT EXPERIENCED RECORD RAINFALL FOR JANUARY TO JUNE?



\*ACCORDING TO NATIONAL RAINFALL RECORDS THAT BEGAN IN 1960  
\*\*MANUAL CLIMATE STATIONS WHERE JUNE DATA IS NOT YET AVAILABLE, BUT THE JANUARY-MAY  
TOTAL WAS HIGH ENOUGH TO BREAK THE RECORD FOR THE FIRST HALF OF THE YEAR

# Accumulated rainfall Auckland Airport

mm of rain

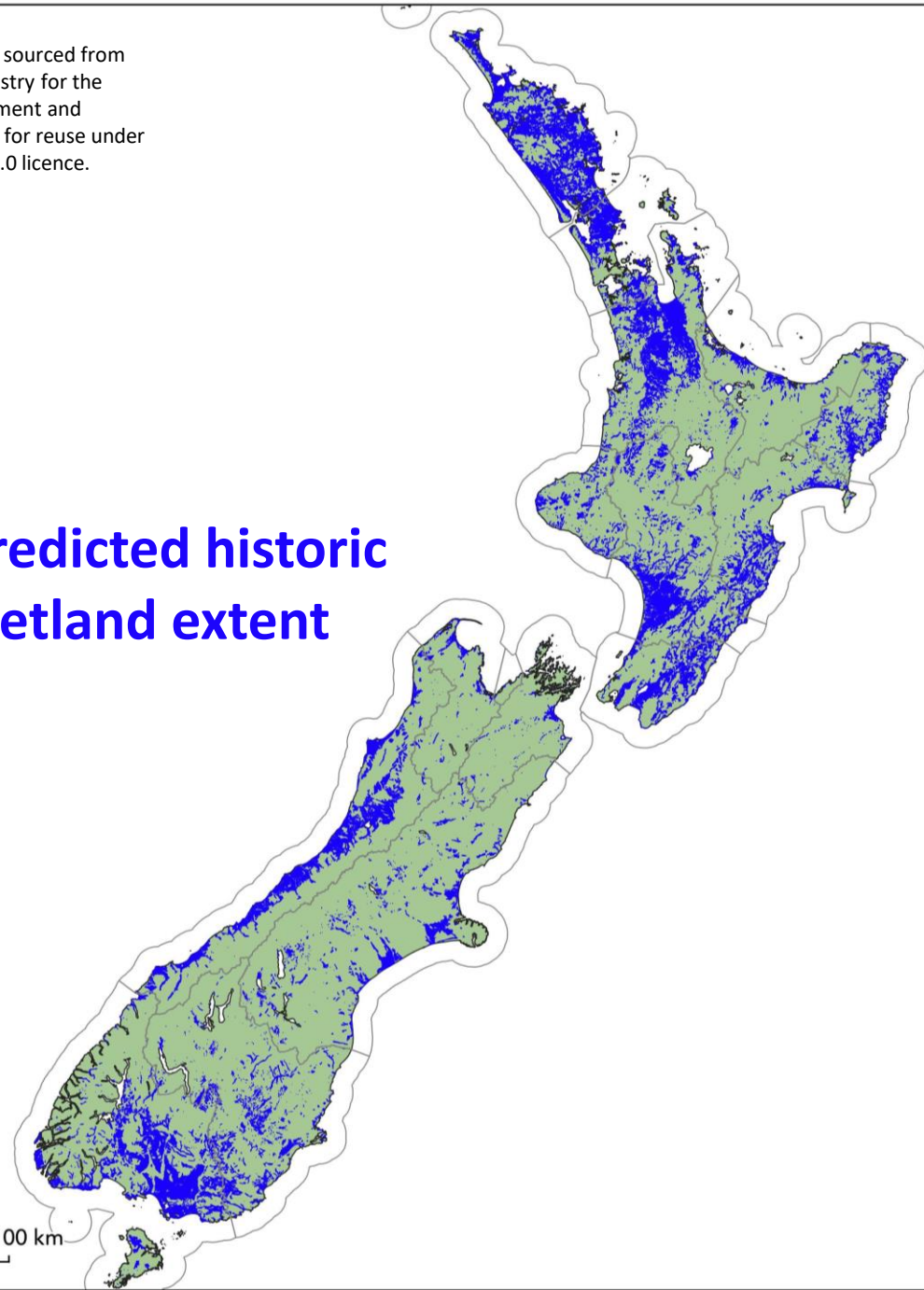


**Richard Easter Twitter**  
"Auckland Airport Rainfall, back to 1963. Thick line is 2023 (doh) Today's effort so far (55mm) in purple..."  
(9 May 2023)

Imagery sourced from  
the Ministry for the  
Environment and  
licensed for reuse under  
the CC 3.0 licence.

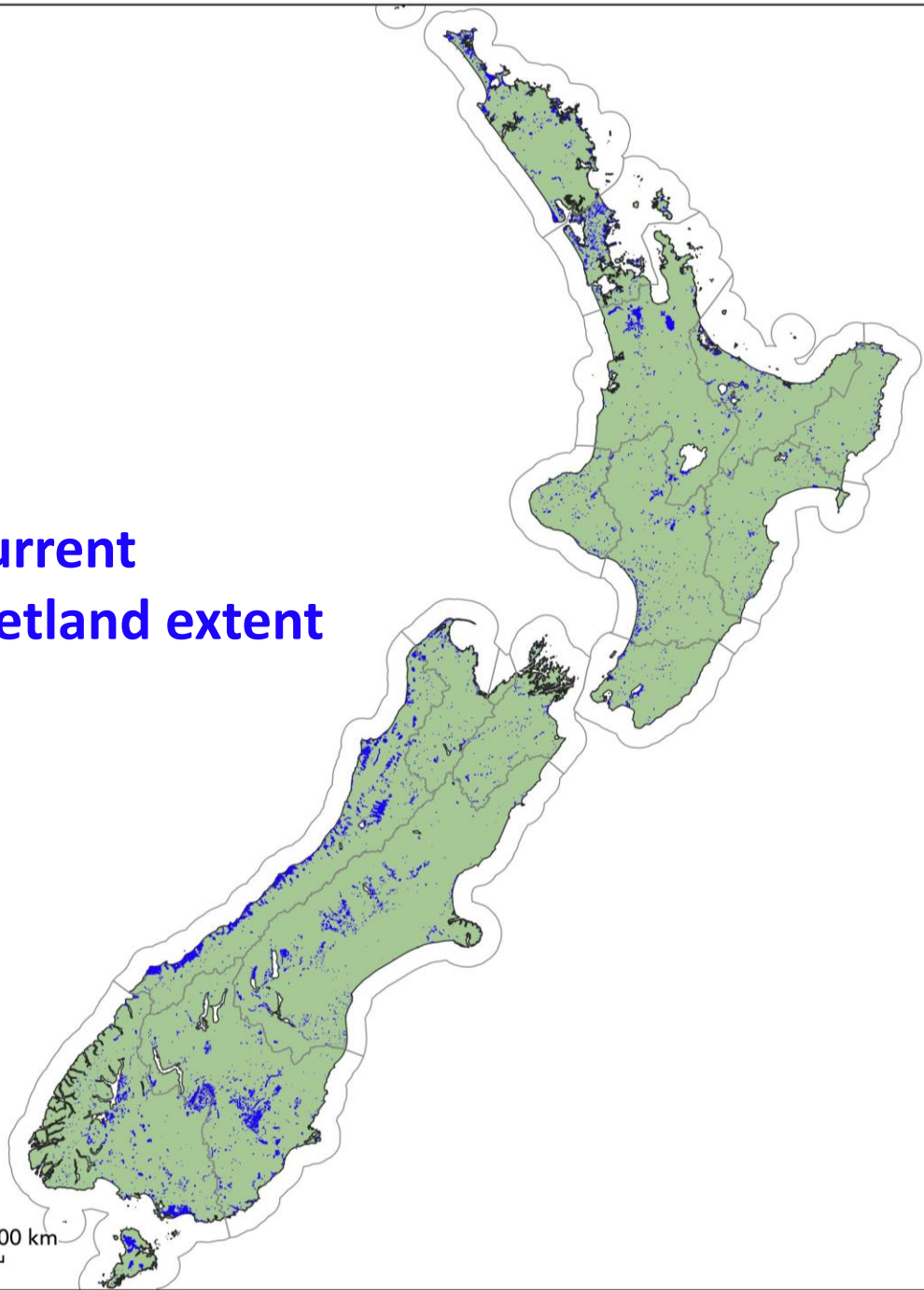
## Predicted historic wetland extent

0 100 km



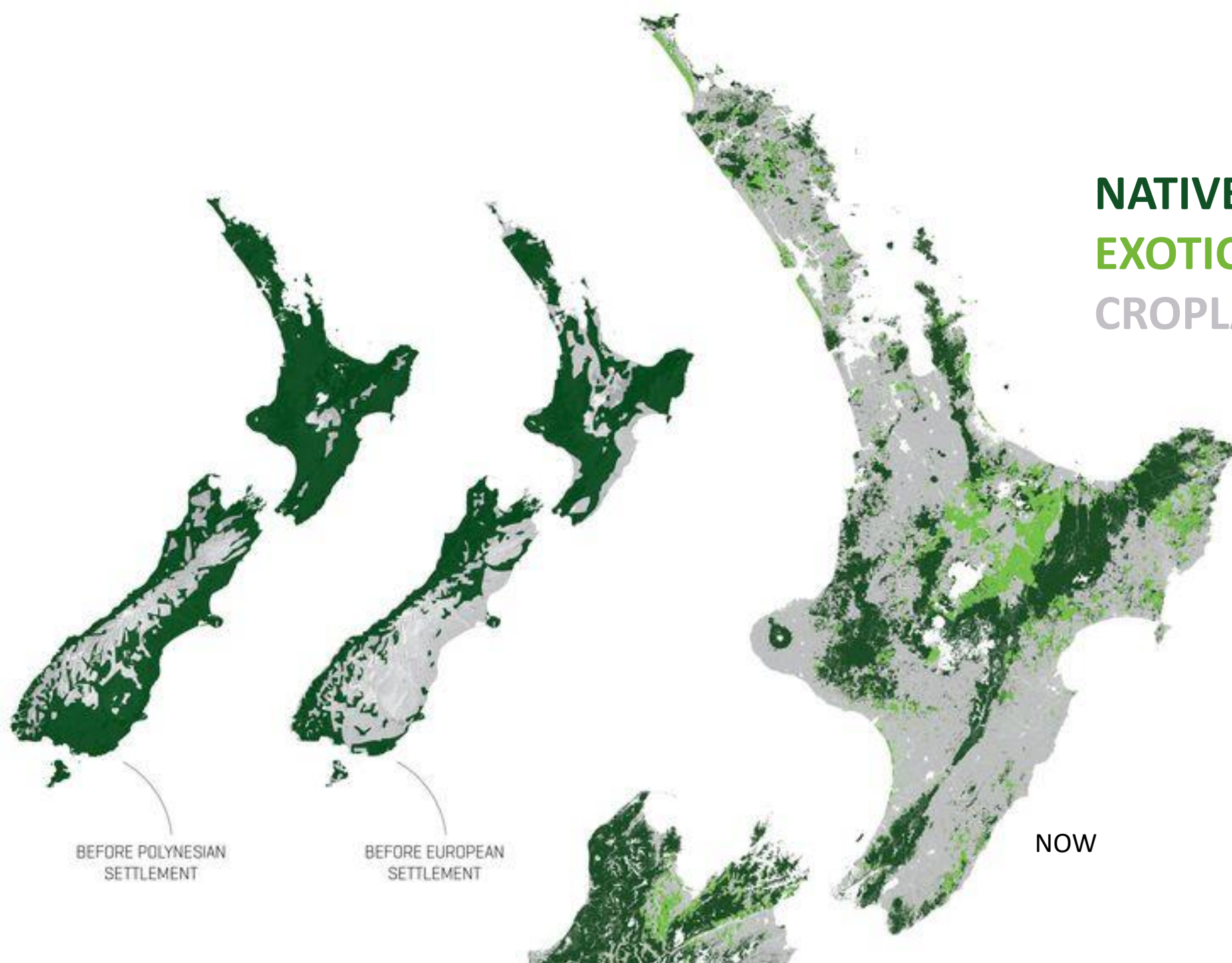
## Current wetland extent

0 100 km





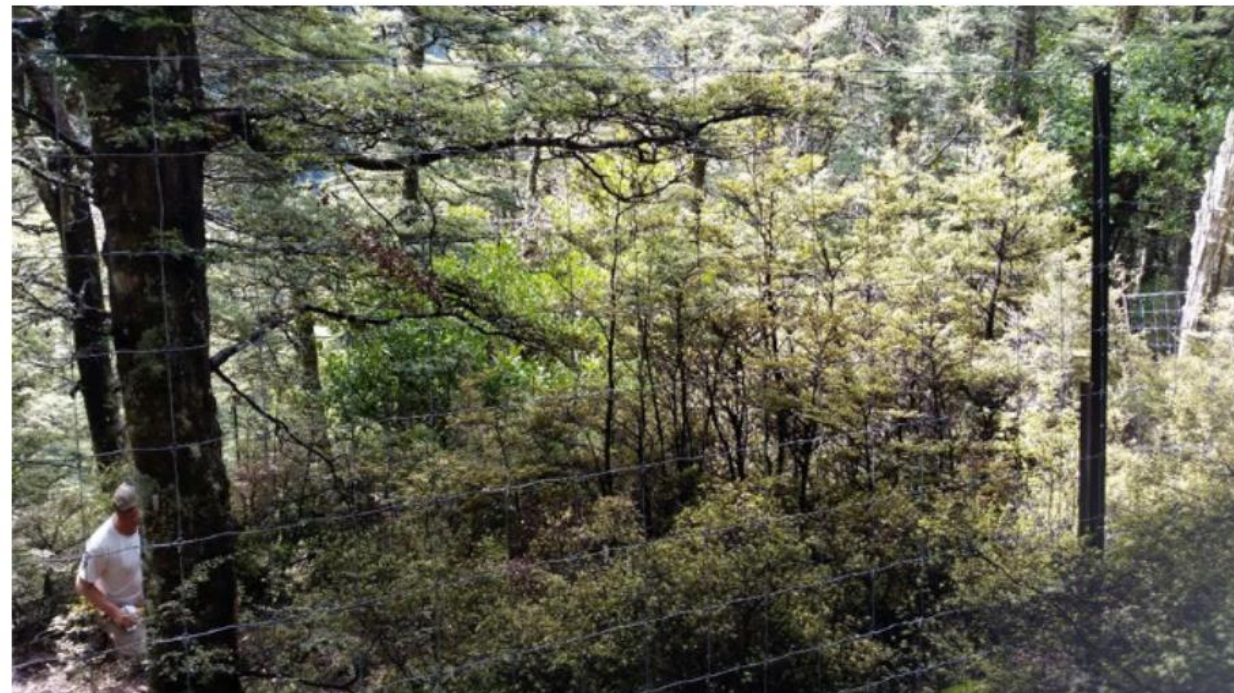
**NATIVE FOREST**  
**EXOTIC FOREST**  
**CROPLAND & GRASSLAND**



BEFORE POLYNESIAN  
SETTLEMENT

BEFORE EUROPEAN  
SETTLEMENT

NOW

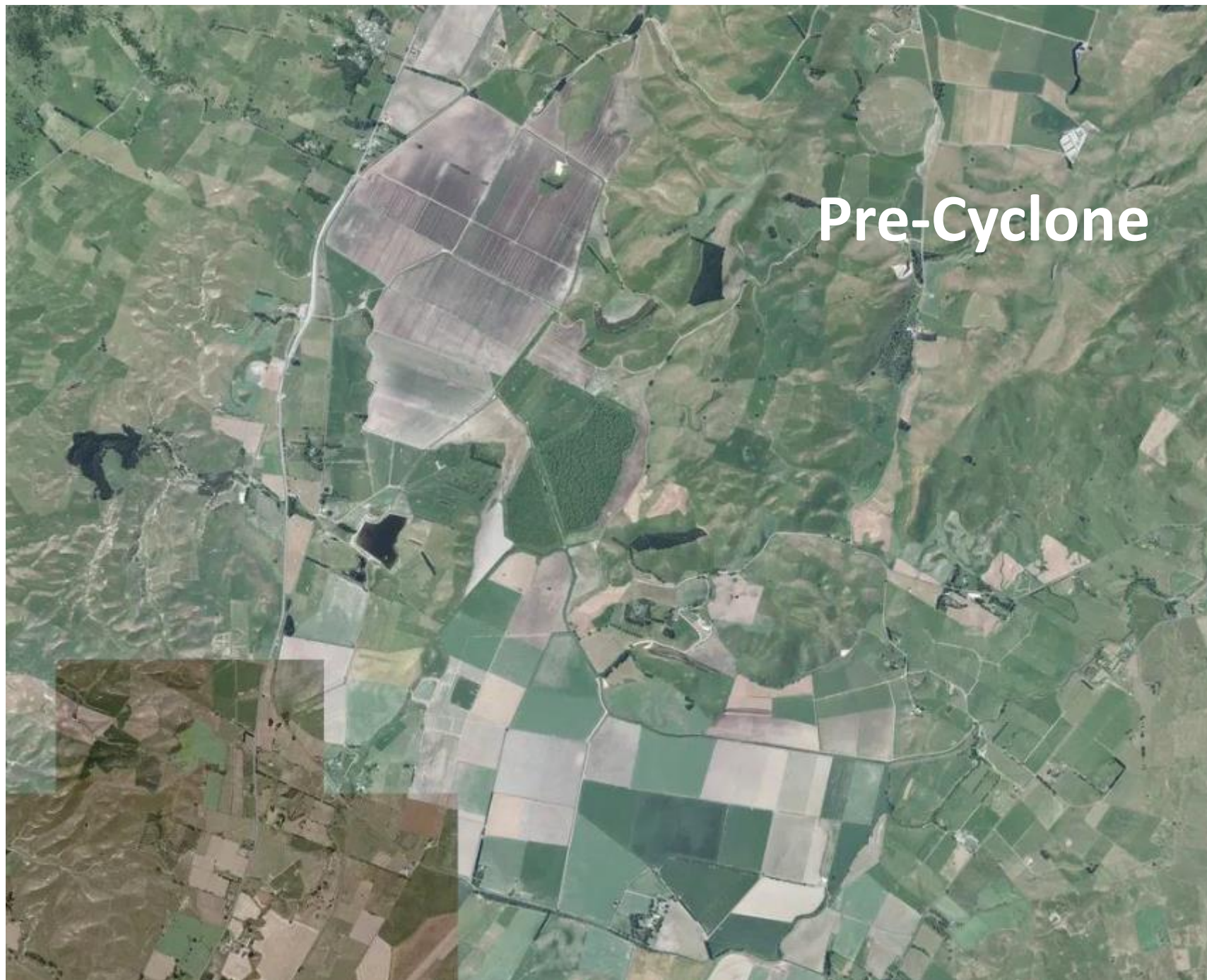


Photos from visit to Spion kop paired fenced and non-fenced plots Sept 2017. Spion kop is in the Manson hunting block, which is the KMB block which receives the most deer hunting pressure from recreational hunters.

Imagery sourced from the Ministry for the Environment and licensed for reuse under the CC 3.0 licence.

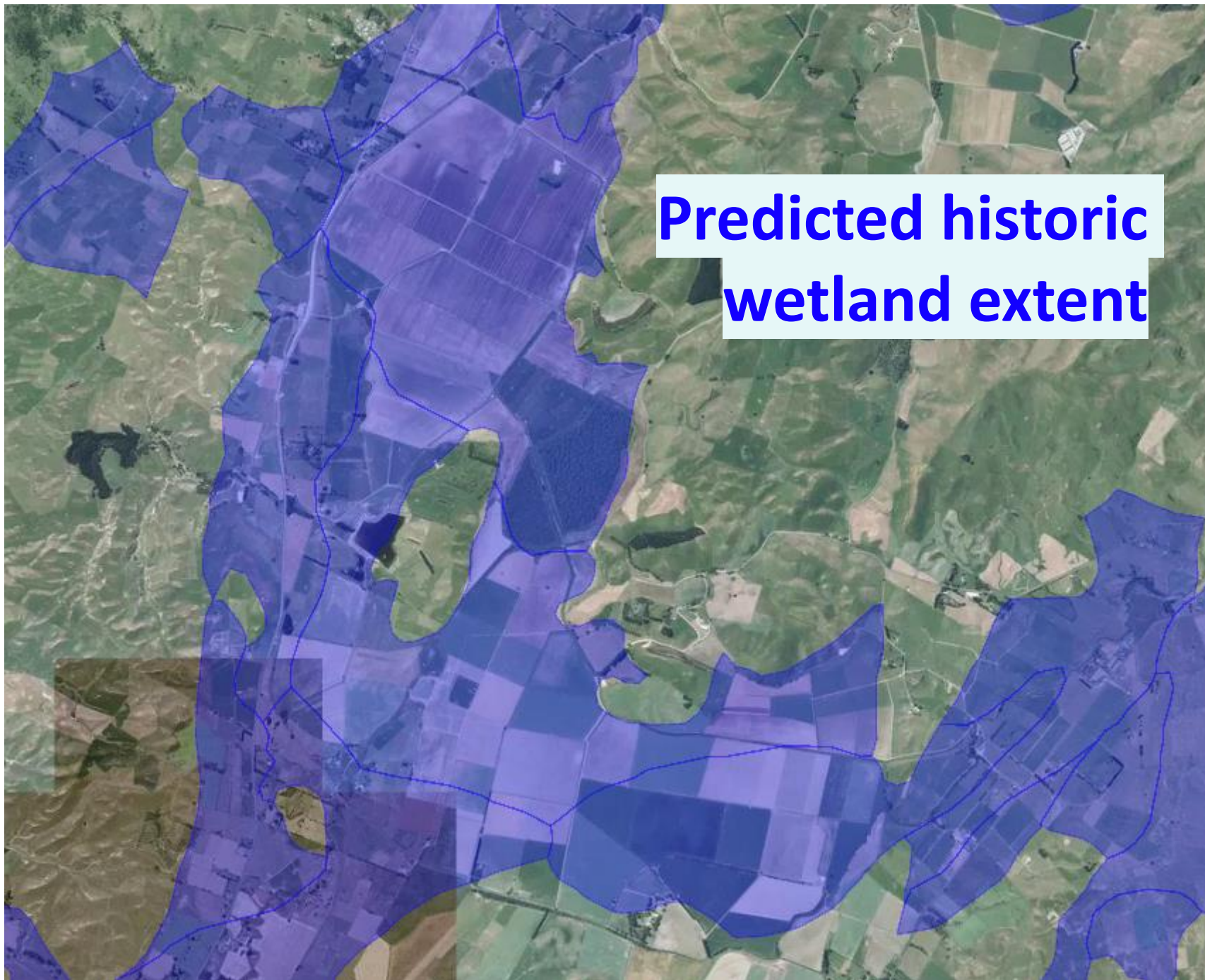


Imagery sourced from the Ministry for the Environment and licensed for reuse under the CC 3.0 licence.



Pre-Cyclone

Imagery sourced from the Ministry for the Environment and licensed for reuse under the CC 3.0 licence.





# Pre-Cyclone Gabrielle



# Post-Cyclone Gabrielle

Image: Tom Kay  
Sediment in Tutaekurī River,  
Redclyffe Bridge







State Highway 50

Tukituki

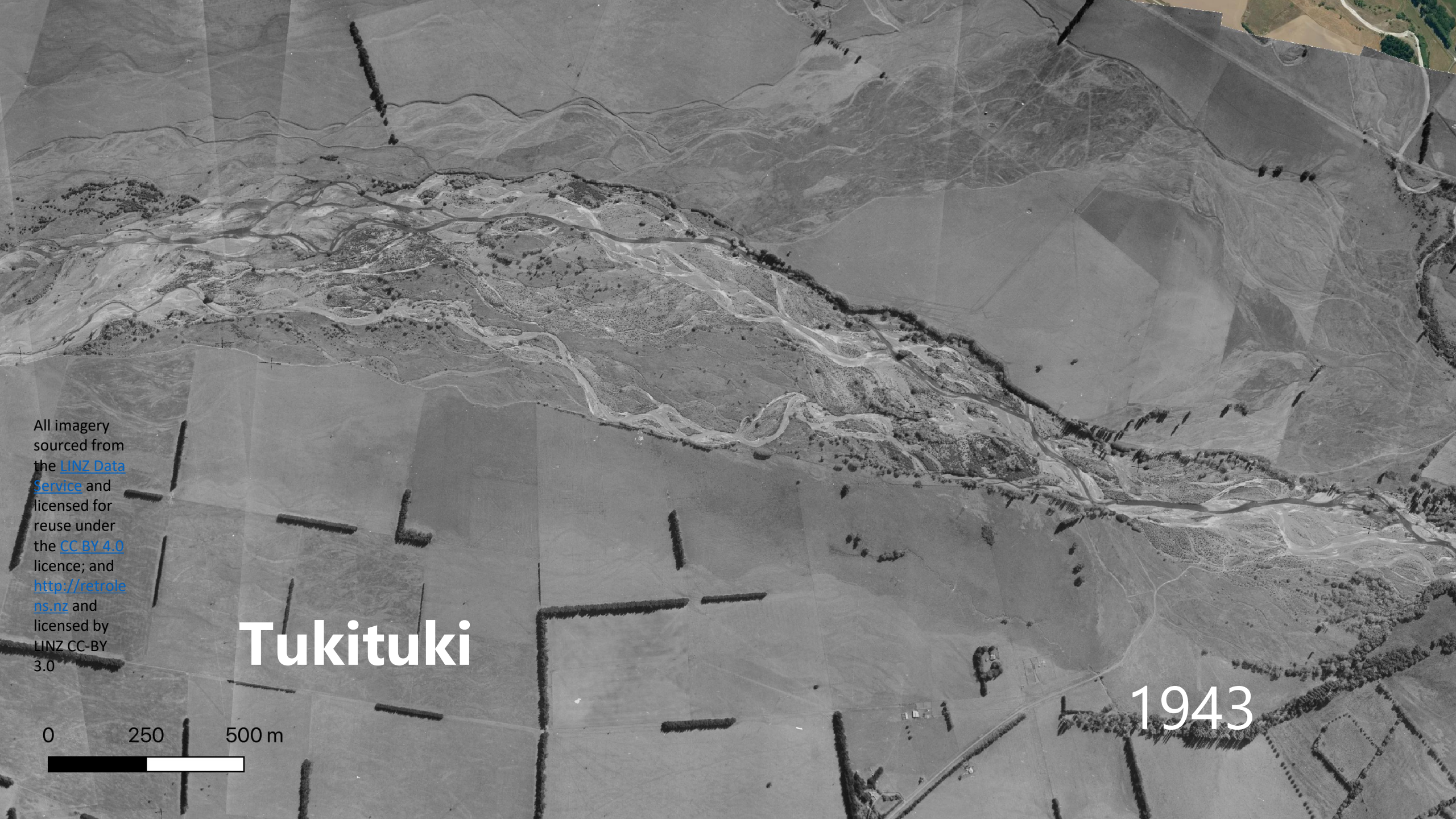
1943



State Highway 50

Tukituki





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# Tukituki

1943

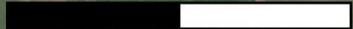




# Tuketiki

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0 250 500 m



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Waipukurau

1943

Tukituki

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Waipukurau

Tukituki



# Ngaruroro River at Maraekakaho



# Ngaruroro River at Maraekakaho








200 m  
500 ft



# Kaituna River mouth - 1939



# Kaituna River mouth - now

# Koordinates.com



Pricing Request a demo

Data x Map x

Get the App Help Log in

### Explore

Popular

Recent

Publishers

Browse

Region v

Data Type v

Publisher v

Date v

License v

tukituki river x

Showing 1-20 of 3,104

**Tukituki River, Hawke's Bay, 1943**  
Thomas Kay

Raster Layer  
0.454m, 1 Tile

CC-BY  
26 May 2023  
1 ↓ 0

Map x

**River flows**  
Ministry for the Environment

Line Layer  
576.2K Lines

CC-BY  
10 Nov 2021  
28.5K ↓ 1.7K

Map +

**NZ River Name Lines (Pilot)**  
Land Information New Zealand

Line Layer  
758.6K Lines

CC-BY  
29 Jun 2022  
47.8K ↓ 3.9K

Map +

**NZ River Centrelines (Topo, 1:50k)**  
Land Information New Zealand

Line Layer  
733K Lines

CC-BY  
23 Sept 2022  
80.9K ↓ 21.5K

Map +

File View Tools History

4 layers x

Find address or place

Contents

Export



- Lake Poukawa, Hawke's Bay, 1939 ... x
  - Ahuriri Estuary, Hawke's Bay, 193... ... x
  - Nqaruroro River, Hawke's Bay, 19... ... x
  - Tukituki River, Hawke's Bay, 1943 ... x
- Basemap Satellite v

10 km  
5 mi



**Palm. Nth**

Tom Kay



**Auckland**

<https://www.aucklandcouncil.govt.nz/environment/looking-after-aucklands-water/stormwater/docs/bmpenvironmental1/caring-for-urban-streams-quick-guide.pdf>



**Blackgate Reserve,  
Manurewa**

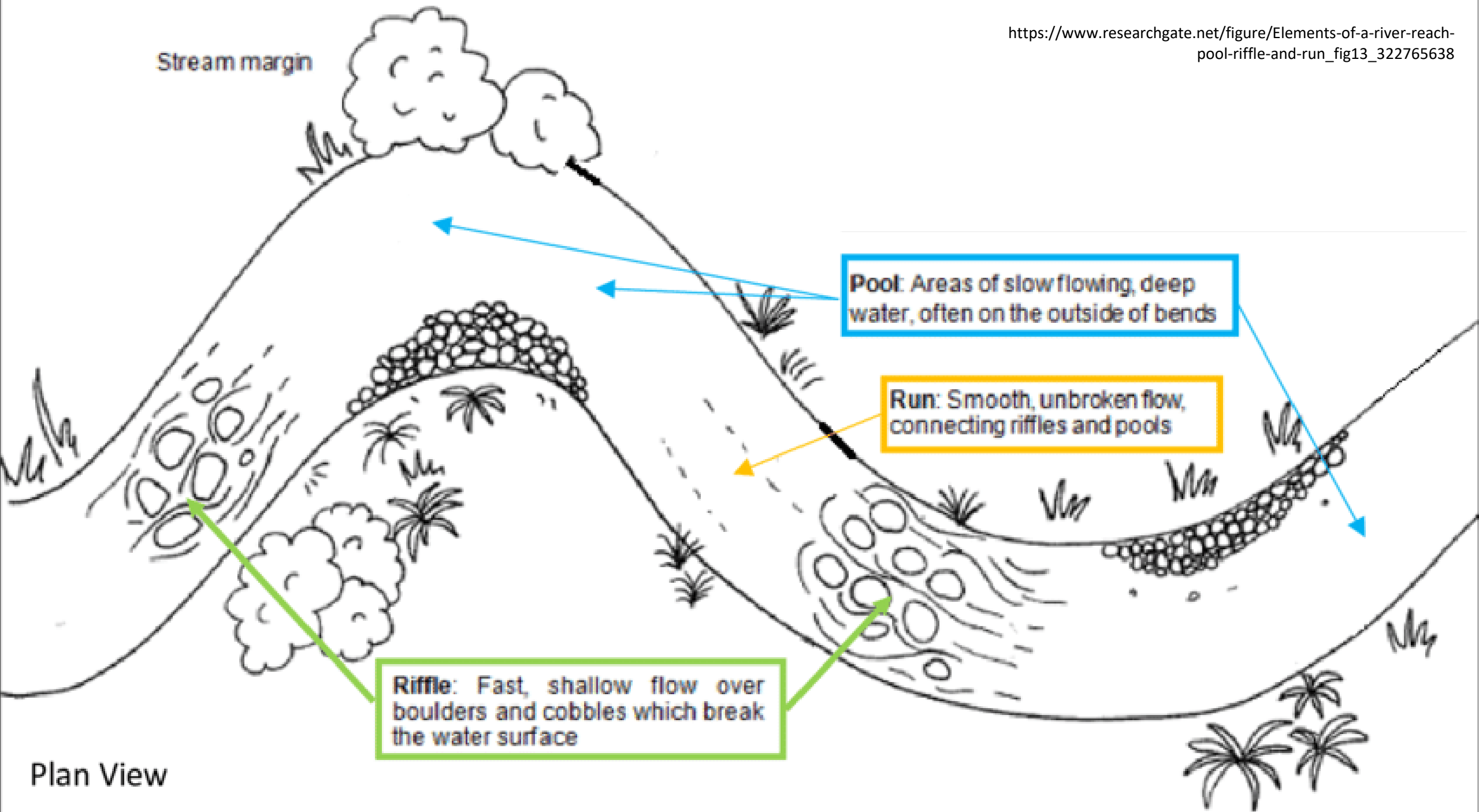
Auckland Council

<https://ourauckland.aucklandcouncil.govt.nz/news/2023/03/concrete-to-make-way-for-natural-waterway/>



**Palm. Nth**

Tom Kay



Stream margin

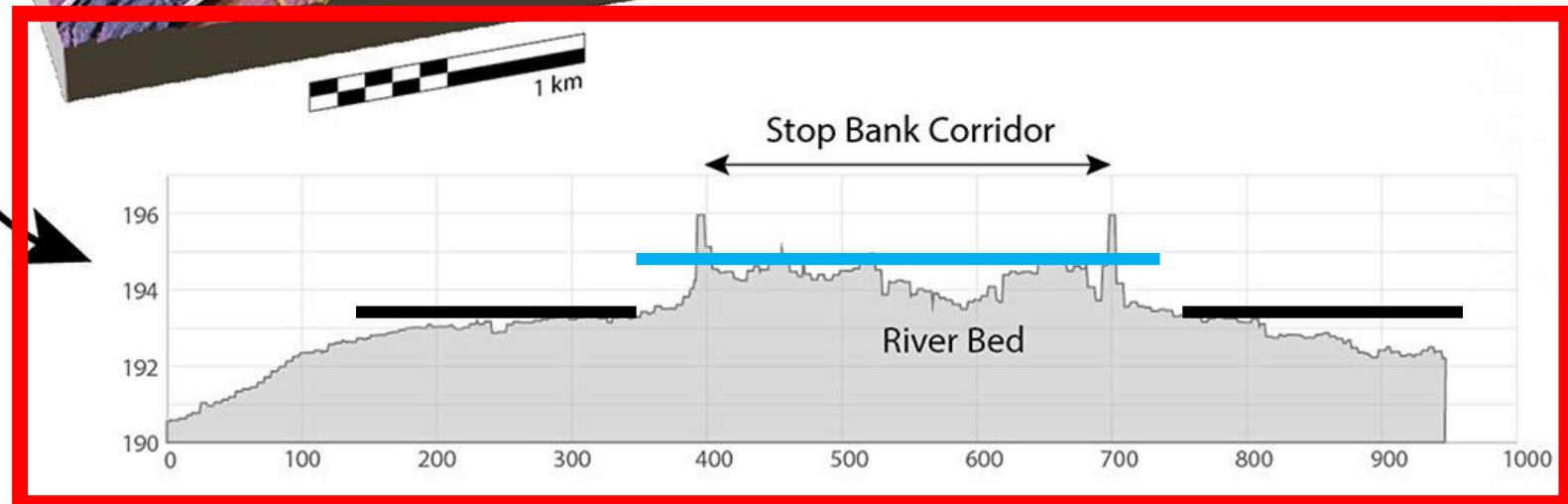
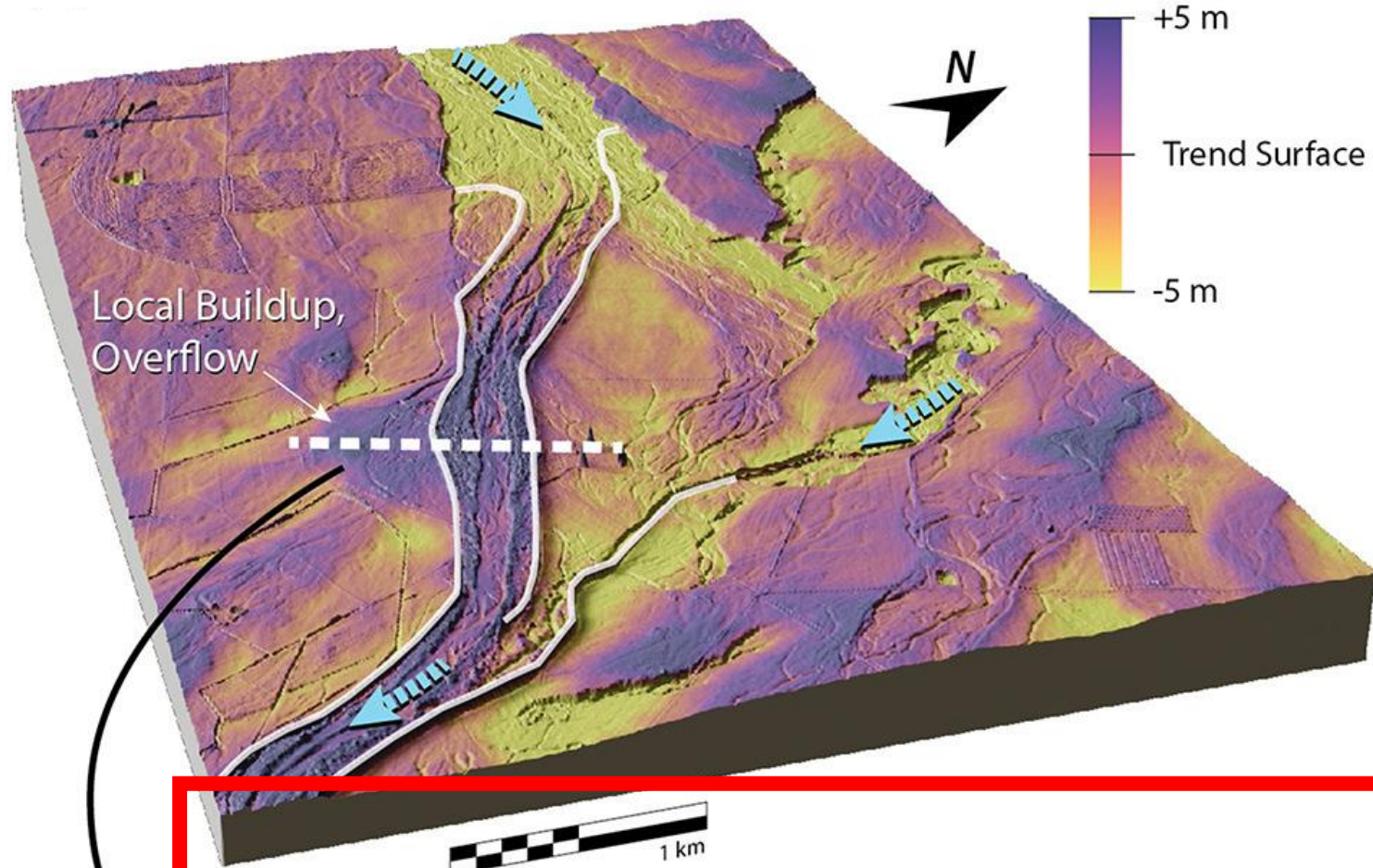
**Pool:** Areas of slow flowing, deep water, often on the outside of bends

**Run:** Smooth, unbroken flow, connecting riffles and pools

**Riffle:** Fast, shallow flow over boulders and cobbles which break the water surface

Plan View

# Tukituki River



'Reanimating the strangled rivers of Aotearoa New Zealand.'

<https://wires.onlinelibrary.wiley.com/doi/full/10.1002/wat2.1624>



# Narrowed Wairau River influencing aquifer recharge levels

Maia Hart Local Democracy Reporter · 05:00, Jun 27 2022



STUFF

A narrowed Wairau River could be contributing to a decline in the Wairau aquifer, a key source of irrigation, drinking and stock water.

# Palmerston North

## Manawatū River

1949



# Palmerston North

# Manawatū River

1949



1949  
channel

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Orthomosaic by Thomas Kay.

# Palmerston North

# Manawatū River

2022



1949  
channel

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Orthomosaic by Thomas Kay.

# Palmerston North, Manawatū River, 1949



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Orthomosaic by Thomas Kay.

# Palmerston North, Manawatū River, 2022



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Orthomosaic by Thomas Kay.

# Existing flood protection 'unsustainable', warns Horizons chairperson

Manawatu reporter · 13:46, Apr 10 2023

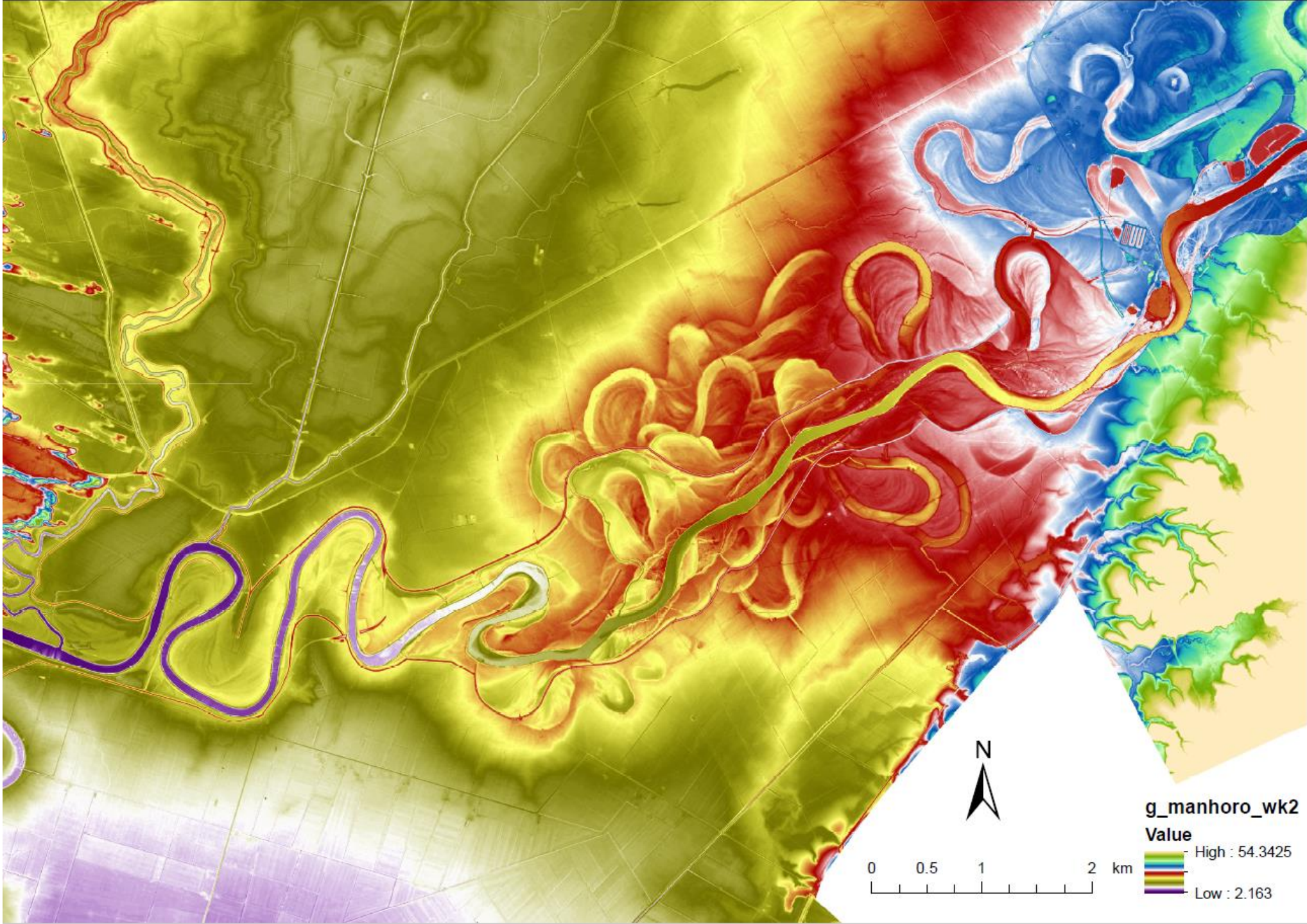


DAVID UNWIN/STUFF

Cyclone Gabrielle changed the landscape surrounding the Pohangina River.

<https://www.stuff.co.nz/manawatu-standard/news/300850095/existing-flood-protection-unsustainable-warns-horizons-chairperson>

Supplied by  
Professor Ian  
Fuller, Massey  
University





# Mangaone, Palmerston North, 1949

koordinates Pricing Request a demo

Search Data Manage Map

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File View Tools History

Making Room for Rivers [↗](#)

Find address or place

Contents

Export



50 m  
200 ft

© MapTiler © OpenStreetMap contributors

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# Mangaone, Palmerston North, 2022

koordinates Pricing Request a demo

Search Data Manage Map

Get the App Help

File View Tools History

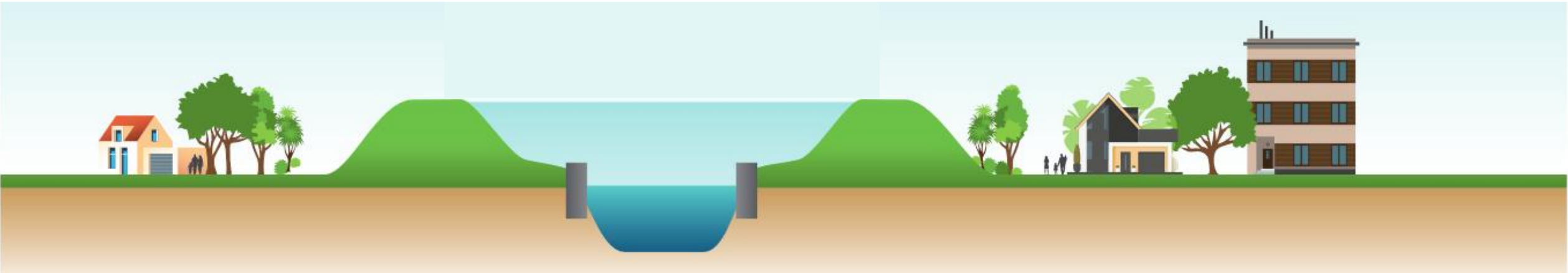
Making Room for Rivers [↗](#)

Find address or place

Contents [↗](#) [Export](#)



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From: Tukua Ngā Awa Kia Rere / Making Room for Rivers – Forest & Bird

An aerial photograph of the Taradale area in New Zealand. The central part of the image shows a dense residential neighborhood with a grid-like street pattern, numerous houses with grey roofs, and scattered green spaces. To the south of the residential area, a wide, light-colored river flows through a green landscape. The river is bordered by a line of trees and a grassy bank. To the east of the river, there are large, open green fields, some of which appear to be agricultural. In the bottom right corner, there are some industrial or commercial buildings. The overall scene is a mix of urban development and natural landscape.

# Taradale

**“Treasury has put the cost of asset damage from the Auckland floods and Cyclone Gabrielle at between \$9 billion and \$14.5 billion.”**

Photo: Steve Dighton



Received: 3 February 2022

Revised: 24 October 2022

Accepted: 5 November 2022










DOI: 10.1002/wat2.1624

**FOCUS ARTICLE**



**WILEY**

# Reanimating the strangled rivers of Aotearoa New Zealand

**Gary J. Brierley**<sup>1</sup>  | **Daniel Hikuroa**<sup>2</sup>  | **Ian C. Fuller**<sup>3</sup>  |  
**Jon Tunncliffe**<sup>1</sup>  | **Kristiann Allen**<sup>4</sup>  | **James Brasington**<sup>5</sup>  |  
**Heide Friedrich**<sup>6</sup>  | **Jo Hoyle**<sup>7</sup>  | **Richard Measures**<sup>7</sup> 

**“working against nature does not work”**

**“[we] may inadvertently be  
manufacturing future disasters”**

**"moving out of harm's way saves lives"**



Parliamentary Commissioner  
for the Environment

LIBRARY COPY

*copy 2.*

**INQUIRY INTO FLOOD  
MITIGATION MEASURES FOLLOWING  
CYCLONE BOLA**

**“...extensive deforestation... has led to... greatly accelerated, widespread, severe erosion...”**

**“draining of wetlands has intensified flooding problems in many areas, as wetlands can “buffer” floodflows.”**

**“...unwise intensive development behind stopbanks has often been encouraged”**



TUKUA  
NGĀ AWA  
KIA RERE

**MAKING  
ROOM FOR  
RIVERS**

A modern way to mitigate flood risk while supporting  
Aotearoa New Zealand's communities, climate, and wildlife.



A NATURE-BASED  
CLIMATE  
SOLUTION

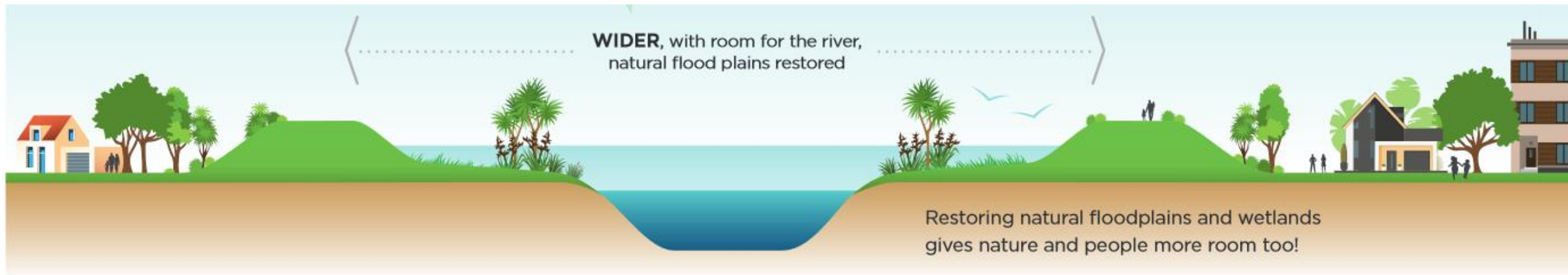
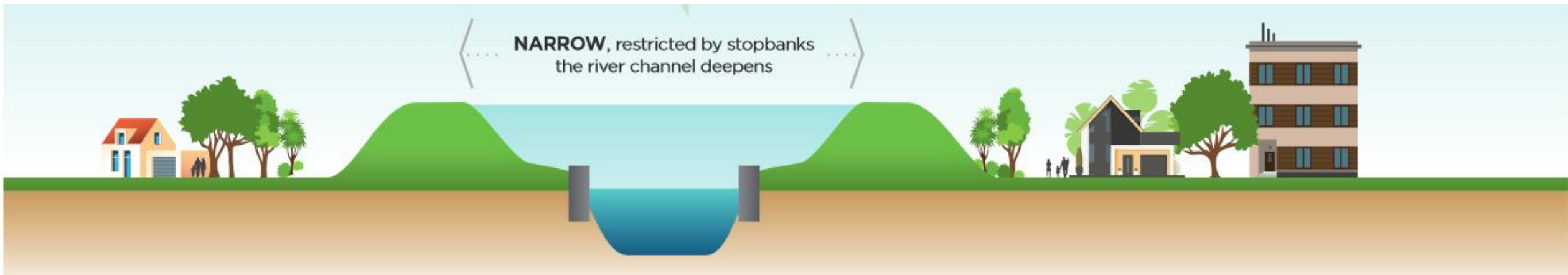


**Forest & Bird**  
TE REO O TE TAIAO | Giving Nature a Voice

**TUKUA NGĀ  
AWA KIA RERE**

**MAKING ROOM  
FOR RIVERS**

LAUNCHED NOVEMBER 2022



# Room for the Waal River

in the Netherlands. © Courtesy of Royal HaskoningDHV



# River Isar, Munich

**before**



**after**



**“International studies show that allowing a river to self-adjust is cheaper and more effective than active interventions that force a river into a particular place.”**

**Te Wai  
Takamori o  
Te Awa  
Kairangi**

**Lower Hutt**





**Te Wai  
Takamori o  
Te Awa  
Kairangi**

**Lower Hutt**



## TE KĀURU UPPER RUAMĀHANGA FLOODPLAIN MANAGEMENT PLAN

DECEMBER 2019



## How Greater Wellington can work towards allowing more room for the region's rivers

Amanda Death

December 2022

## Policy 52

When considering... hazard mitigation measures, particular regard shall be given to:

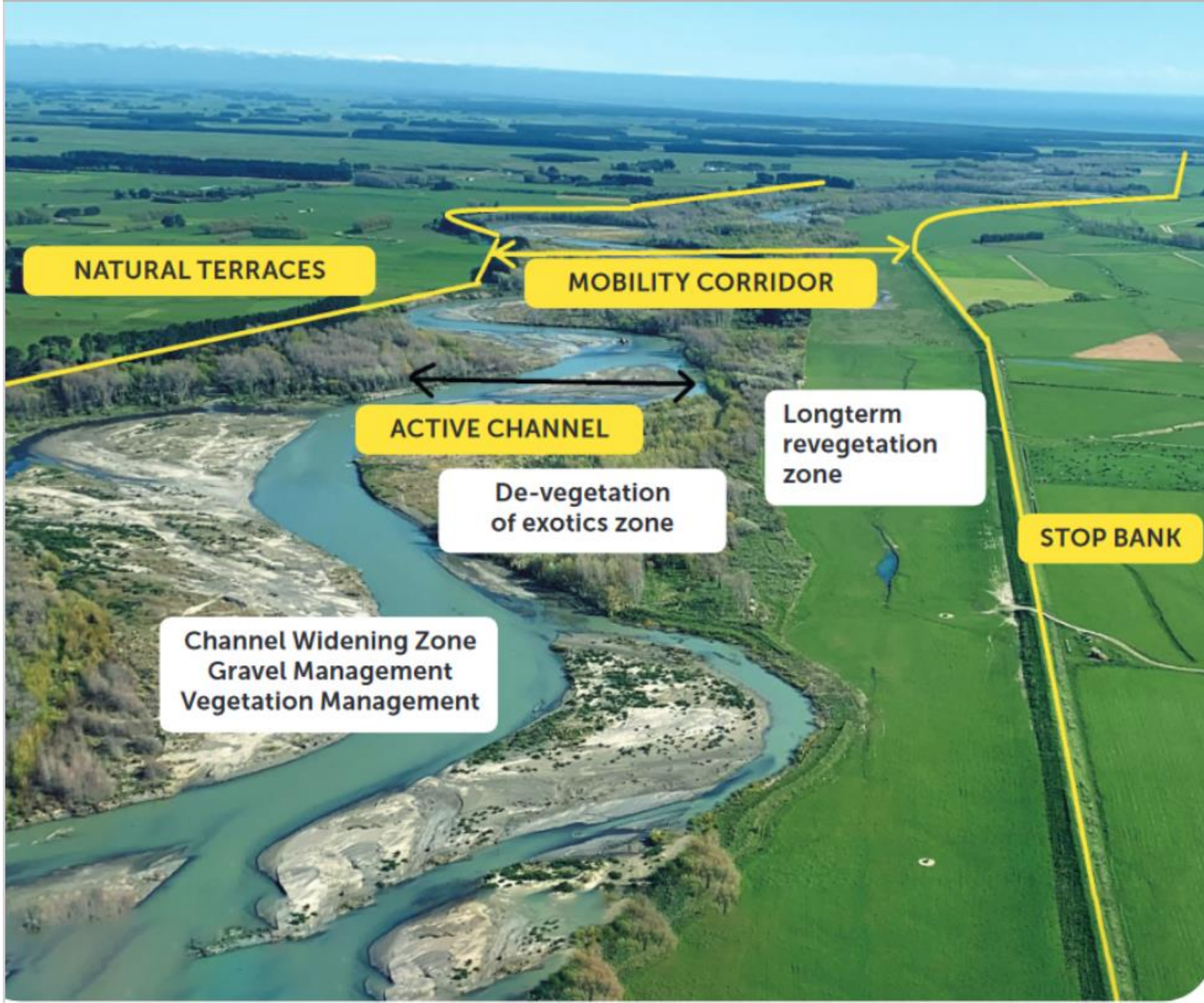
~~(a) the need for structural protection works or hard engineering methods;~~

(b) whether non-structural, soft engineering, green infrastructure, room for the river or Mātauranga Māori options provide a more appropriate or suitably innovative solution...

# Mayor supports 'Making Space for Water'

Publish Date : 17 May 2023    MAYOR





**Climate resilience  
project, co-funded  
with Kānoa**

**Policy 1:** Freshwater is managed in a way that gives effect to Te Mana o te Wai.

**Policy 7:** The loss of river extent and values is avoided to the extent practicable.

**Policy 9:** The habitats of indigenous freshwater species are protected.

## National Policy Statement for Freshwater Management 2020

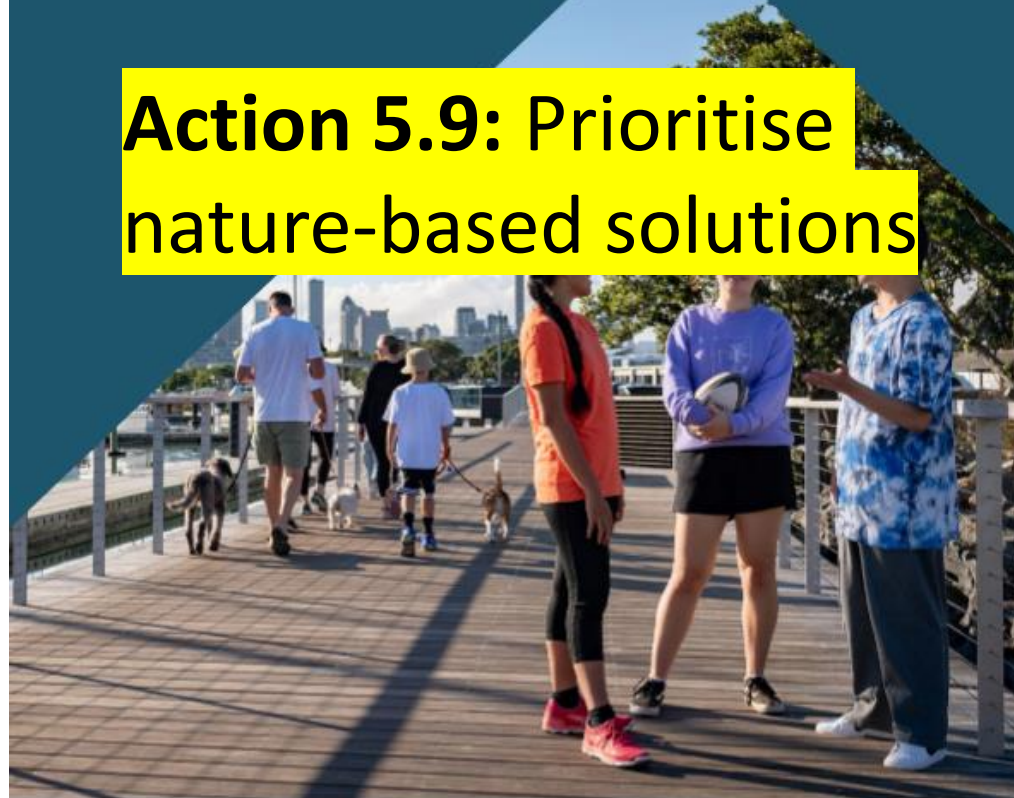
February 2023

## Urutau, ka taurikura: Kia tū pakari a Aotearoa i ngā huringa āhuarangi

Adapt and thrive: Building a  
climate-resilient New Zealand

AOTEAROA NEW ZEALAND'S  
FIRST NATIONAL ADAPTATION PLAN

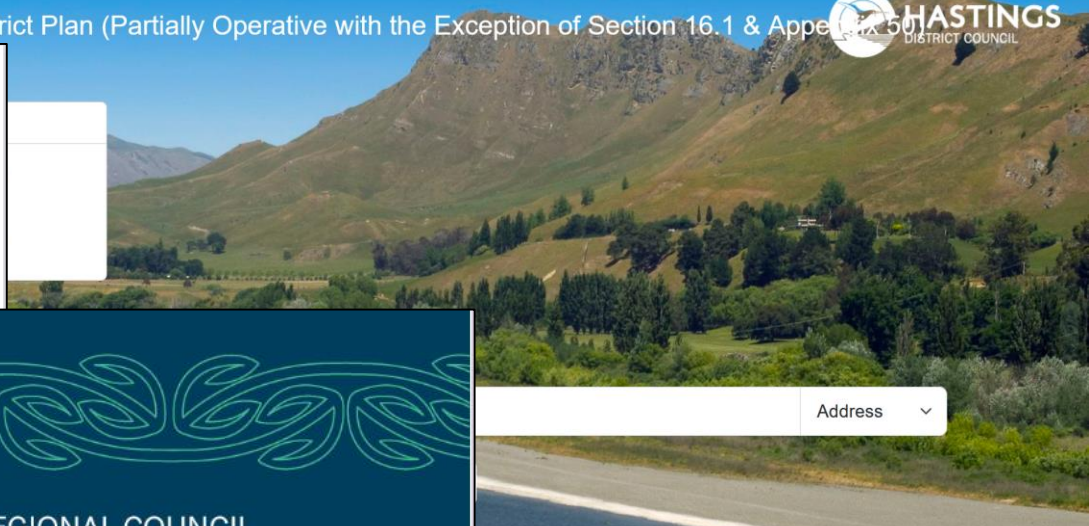
**Action 5.9:** Prioritise  
nature-based solutions





**TIME TO ACT**  
Kia Rite!  
2021 - 2031

**Hawke's Bay Regional Council**  
**30 Year Infrastructure Strategy**  
2018 - 2048



Address

**Wellbeing Budget 2023**  
Support for today  
Building for tomorrow  
18 May 2023

Wellbeing Budget 2023  
SUPPORT FOR TODAY  
BUILDING FOR TOMORROW  
Te Kāwanatanga o Aotearoa  
New Zealand Government

EMBARGO: Contents not for communication in any form before 2:00pm on Thursday 18 May 2023



Hawke's Bay Regional Council  
Operat  
28 August

**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

**Mahere ā-Ta**  
2022-2023  
**Annual Plan**

hbrc.govt.nz

**MWH**  
BUILDING A BETTER WORLD

**Ngaruroro River Flood Protection and Drainage Scheme**  
**Ecological Management and Enhancement Plan**  
Prepared for Hawke's Bay Regional Council  
March 2011

IBRC Publication 4276  
HBRC report AM 11-04

# Rangitata / Rakitata

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licence; and <http://retrolens.nz>  
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Orthomosaic by Orianne Etter.



1937



**“A possible effect of climate change is that cyclones of some form could pass close to New Zealand with increasing frequency. It may be that in retrospect the Bola storm will not be regarded as such an extreme event.”**

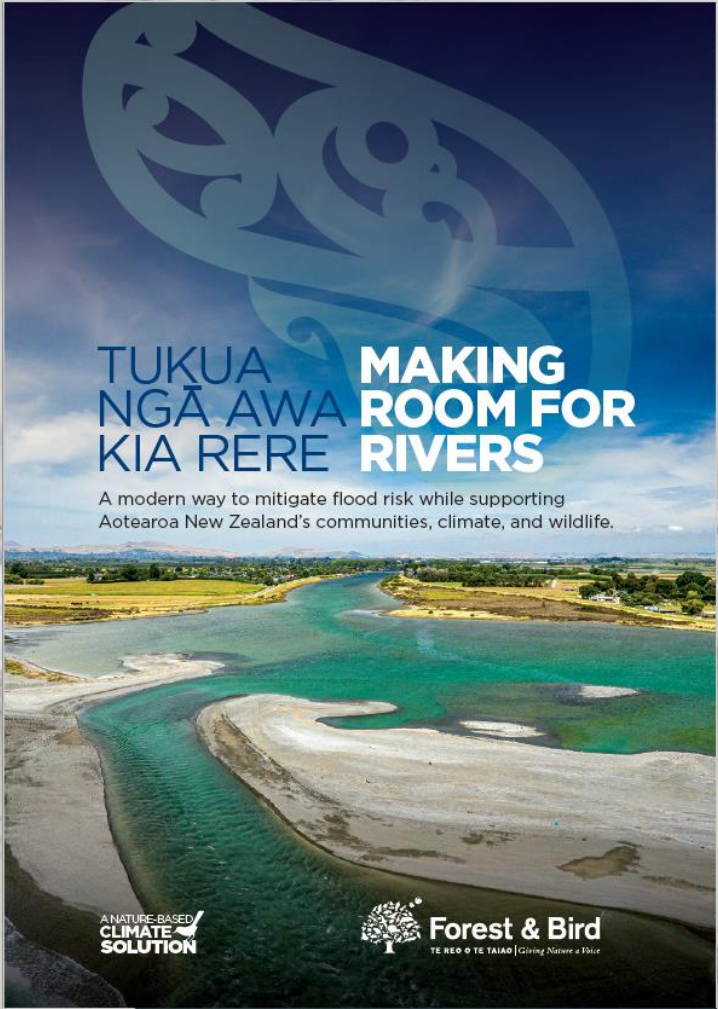
**“In the interests of future generations... government cannot allow the... nation’s floodplain land to be unwisely used.**



Emerson St. Napier

Emerson Street, Napier,  
after the 1931 Hawke's Bay  
earthquake.

Pickering E, fl 1977  
:Photographs of the Napier  
earthquake. Ref: 1/2-  
002942-F. Alexander  
Turnbull Library,  
Wellington, New Zealand.  
[/records/23133174](#)



Received: 3 February 2022 | Revised: 24 October 2022 | Accepted: 5 November 2022  
 DOI: 10.1002/wat2.1634

Check for updates

WIREs WATER WILEY

**FOCUS ARTICLE**

**Reanimating the strangled rivers of Aotearoa New Zealand**

Gary J. Brierley  
 Jon Tunnick  
 Heide Friedrich

**Greater Wellington**  
 Te Pane Mātua Taiao

**How Greater Wellington can work towards allowing more room for the region's rivers**

Amanda Death  
 December 2022

**1 | INTRO**  
**NEW ZEALAND**

Command-and-control they restrict the c  
 Fryirs & Brierley, between engineers

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WIREs Water. 2022;2:1634.  
<https://doi.org/10.1002/wat2.1634>

