MARCH/APRIL 2017

FLOOD OF EVENTS: A SUMMARY

HE WAIPUKE TAKUNETANGA: WHAKARĀPOPOTO

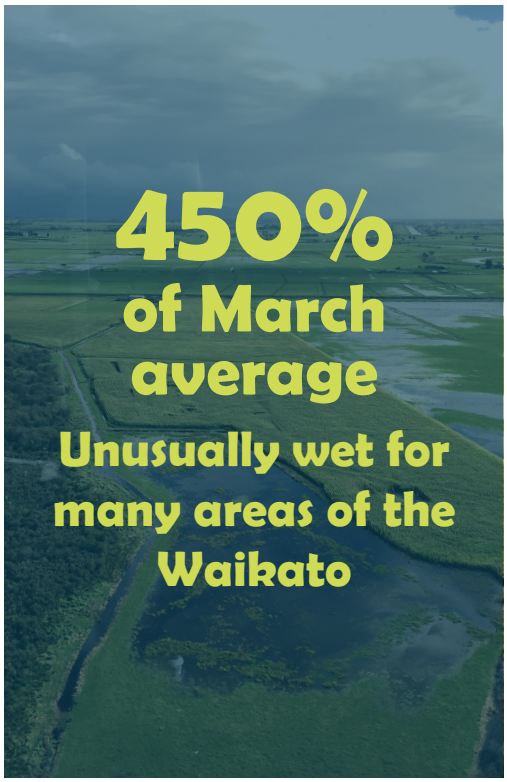
REGIONAL CONTEXT

WHAT HAPPENED

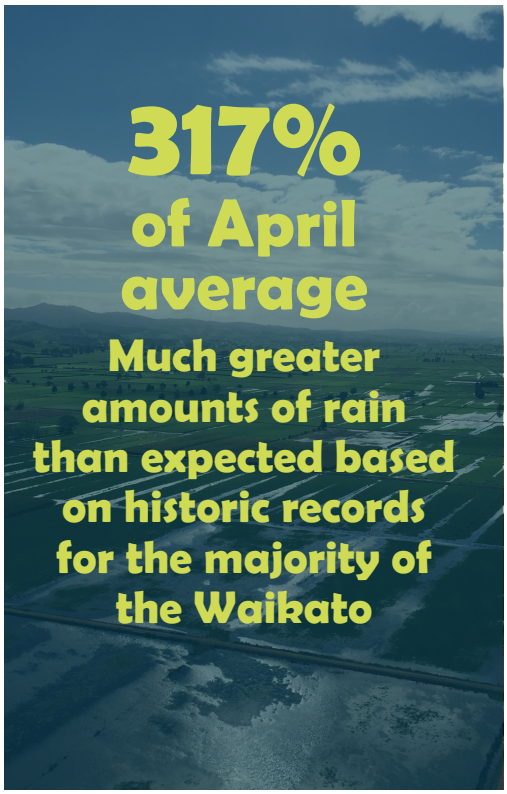
Autumn 2017 was exceptionally wet for the Waikato region, with record rainfalls and flows through March and April due to a series of consecutive weather events.

- Heavy rainfall bands occurred in the region. The two most significant occurred overnight on 7/8 March and 10/11 March and were colloquially termed the 'Tasman Tempest'.
- Ex-Tropical Cyclone Debbie made landfall in New Zealand on 4 April. The non-frontal, low pressure system caused heavy rainfall across the Waikato region, but was relatively short-lived with heavy rainfall easing by the early hours of 6 April.
- Ex-Tropical Cyclone Cook and another Tasman Low combined to produce 3½ days of heavy rainfall from 11-14 April.

The prolonged period of high rainfall created very vulnerable catchments, saturated soils, and challenging flood management conditions due to relatively high pre-existing river levels and decreased storage in flood protection scheme components.



All sites (except April for Kaimai Summit) recorded greater than 100% of average rainfall for both March and April 2017.



WINTER 2017

What NIWA is predicting

Normal or below normal winter rainfall levels is predicted by NIWA for winter 2017. However, even with relatively moderate rainfall events, the current elevated river levels and saturated catchments means affected areas are at risk from further high flows and flooding issues.

IN THE WAIHOU PIAKO ZONE

TIER 2 flood response declared

The cumulative effects of the March and April events have been significant.

The Piako River in particular did not have an opportunity to recover between each event and it is now recognised that above average water levels are likely to remain over winter.

The magnitude of the events resulted in significant debris, gravel movement and stream bank erosion in key waterways. It also resulted in the activation of the Kauaeranga and Piako river spillways and captured a significant amount of water behind the Kapukapu dam.

Investigations showed some erosion, deposition or fencing damage to council land or assets on all of the eastern Waihou catchments. In particular the Kauaeranga, Puriri, Komata, Hikutaia and Tararu rivers required large amounts of gravel and or erosion works to be completed.

The impact of the March event was exacerbated by the April events. The cumulative effects of the three rainfall events caused further disruption and damage to property and infrastructure across the Hauraki plains.

Hunua catchment: The heaviest rainfalls recorded in March were in the Hunua area, which feed the Miranda and Kaiaua area catchments. These levels reached over 1% annual exceedance probability (AEP).

Kauaeranga catchment: The Kauaeranga River recorded a 10-5% AEP (10-20 ARI) event immediately after the initial heavy rainfall band on 8 March. This corresponds with the first time the spillway operated during the event. The second time the spillway operated on 10 March, the levels corresponded with a similar sized rainfall event. Although not creating any damage when operating, the river does require access to Thames via the Ngati Maru Highway to be closed. It also carries debris which requires removal. This was undertaken by landowners and the NZ Transport Agency.

Thames Town catchments: In Thames, the Karaka Stream debris trap and sediment pond were re-cleaned after the second event. Houses on Barrett Road required pumping of floodwaters from the Kauaeranga River, with council staff assistance.

Kapukapu dam catchment: Significant amount of rain captured behind the dam, which peaked at approximately 7m. The debris was removed the following day.

Puriri catchment: Pasture and numerous private fences were damaged by large amounts of forestry debris and flood water.

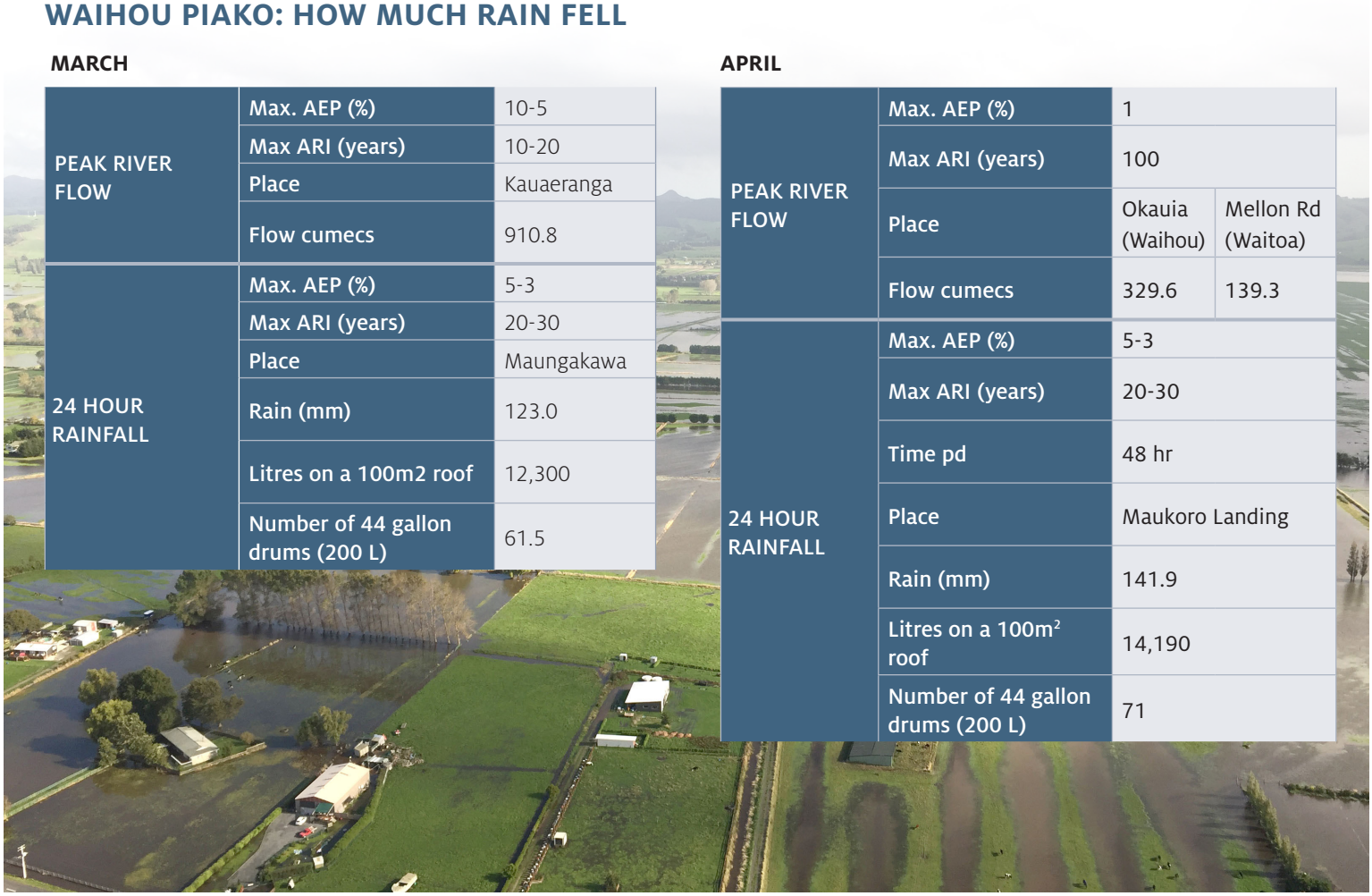
WAIHOU PIAKO: HOW MUCH RAIN FELL

MARCH

PEAK RIVER FLOW	Max. AEP (%)	10-5
	Max ARI (years)	10-20
	Place	Kauaeranga
	Flow cumecs	910.8
24 HOUR RAINFALL	Max. AEP (%)	5-3
	Max ARI (years)	20-30
	Place	Maungakawa
	Rain (mm)	123.0
	Litres on a 100m2 roof	12,300
	Number of 44 gallon drums (200 L)	61.5

APRIL

PEAK RIVER FLOW	Max. AEP (%)	1	
	Max ARI (years)	100	
	Place	Okauia (Waihou)	Mellon Rd (Waitoa)
	Flow cumecs	329.6	139.3
24 HOUR RAINFALL	Max. AEP (%)	5-3	
	Max ARI (years)	20-30	
	Time pd	48 hr	
	Place	Maukoro Landing	
	Rain (mm)	141.9	
	Litres on a 100m^2 roof	14,190	
	Number of 44 gallon drums (200 L)	71	



What's an AEP?

An annual exceedance probability (AEP) is the probability of an event occurring in any given year. i.e. A 1% AEP means there is a 1 in 100 chance in any given year of the event occurring in any one year, and a 10% chance of occurring in any given 10 year period.

This is calculated by taking all events of a given magnitude and averaging over the entire time-period data exists over. For example, if there was 100 years of data and an event of X mm rainfall occurred five times over the data period, on average this would mean that one event occurs every 20 years. This equates to a 5% AEP (by dividing 1 by 20 years and multiplying by 100 to give a percentage).

What's an ARI?

An annual recurrence interval (ARI) is sometimes also known as 'return period'. It is the average number of years that it is predicted will pass before an event exceeding a given magnitude occurs.

It is the inverse of the AEP and another way of presenting the same statistical data. 1% AEP is equal to a 100 year ARI, a 2% AEP is a 50 year ARI, and a 10% AEP is a 10 year ARI.

Both ARI and AEP values are based on statistical calculations and represent the average timing of events. These may not be exact and although relatively unlikely, a number of 1% AEP or 100 year ARI events could occur within the same year. The size of a certain AEP event will also change through time. This is because as more events occur the statistical likelihood changes. For example, if three 1% AEP events occur in one year the average likelihoods change and the magnitude of a 1% AEP event increases.

PUMP OPERATION

The Waihou Piako flood protection schemes include 52 pump stations. These pumps provide a service level to the community by transferring water from drainage networks into rivers. During the flood events the call on these assets was significant and well above normal for the time of year.

Highest pump running hours for April 2017

PUMP	MARCH HOURS	APRIL HOURS	% OF POSSIBLE APRIL HOURS (720)
Phillips Road	110	557	77%
Manga-whero 1	110	555	77%
Manga-whero 2	124	438	61%
Kaihere	171	413	57%
Pouarua No 1/1	144	404	56%
Pouarua No 1/2	323	317	44%
Waikaka South	55	385	53%
Rawe Rawe	238	371	52%
Kerepehi Extension	115	476	66%
T Head	358	654	91%
Stocks/2	44	207	29%
Mill Rd/2	236	349	48%

Piako scheme under the microscope

The hydraulic design of the Piako flood scheme is currently being reviewed by Waikato Regional Council to make sure it's still doing what it was designed to do. The review is every 10 years.

Surveys have been completed of the Piako River and all its tributaries, and this data has been peer reviewed. Modelling is now underway to assess if the original principles of how the scheme operates still apply, and what improvements – if any – need to be made and by whom.

As part of this broader review, we are incorporating information on how the scheme responded in the March and April events.

All up these major flood scheme reviews generally take two years. We hope to have this review completed by the end of 2017 and will be sharing the findings with our communities.

THE COST OF RECOVERY

$496,466
IN WAIHOU PIAKO

$264,112
IN WAIHOU

$232,354
IN PIAKO

Throughout the Waihou Piako zone, staff undertook both ground and aerial inspections, and connected with key landowners and external agencies to gauge the extent of damage and to assist in coordinating a response.

A flood event remediation plan has now been prepared.

Some of remediation works have been resolved, some are currently underway and other work will be undertaken in the 2017/18 financial year.

Some technical investigation work has been identified. This information will be used to assess the Piako scheme performance, and will be incorporated into the Piako Scheme review project.

As the Miranda and Kaiaua areas are not covered by flood and river management funding, council staff were only able to provide information and advice despite receiving multiple calls from local landowners for assistance. It is intended that options to address this issue will be discussed with locals through the council's 2018-2028 Long Term Plan.

FLOOD WARNING SERVICE

Email **regional.hazards@waikatoregion.govt.nz** to sign up for the flood warning service or 0800 800 401 and ask for the senior emergency management officer (EMO).

For more information call Waikato Regional Council on 0800 800 401 or visit waikatoregion.govt.nz

July 2017

Waikato REGIONAL COUNCIL
Te Kaunihera ā Rohe o Waikato