BAY OF PLENTY REGIONAL COUNCIL
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Hydro-meteorological Report of April 2017 Storm Event & Cyclone Cook

2 June 2017

Prepared by Glenn Ellery

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Cover Photo: Rangitāiki River at Te Teko recorder site 7 April 2017

Acknowledgements

Bay of Plenty Regional Council acknowledges the contributions of the Meteorological Service of New Zealand Limited and NIWA who supported Council during the events with information and contributed to the content of this report.

Introduction

This report summarises the hydro-meteorological aspects of the flood event occurring across the Bay of Plenty region over the period 3-7 April 2017 and the closely following passage of Cyclone Cook on 13 April 2017. It provides an overview of weather patterns leading up to the events and quantifies the effects of the events through collected environmental data.

Data collected during the events was analysed against previously recorded data and recognised models to give estimates of exceedance return probabilities for locations of interest within the Bay Of Plenty region. The data used for this report was the best available at the time of production but the reader should be aware that there may be some changes into the future as quality assurance processes and refinement occurs.

The Data Services group operates a network of approximately 130 automated monitoring stations throughout the regions collecting a wide range of environmental data; this data is collected in accordance with relevant National Environmental Monitoring Standards (NEMS) or where NEMS do not exist, best practice. The Council network is supplemented by a further 12 sites operated by the National Institute of Water and Atmosphere.

Contents

Part 1: Situation

The Bay of Plenty region was subjected to two significant events during the period 3-13 April 2017. A description of the antecedent conditions present is provided along with a brief synoptic description of each storm event.

1.1 Antecedent Conditions

At the beginning of April 2017 the Bay of Plenty region had just experienced a very wet month of March where rainfalls of 1.5 - 5 times historical recorded monthly normal had occurred, Figure 1.

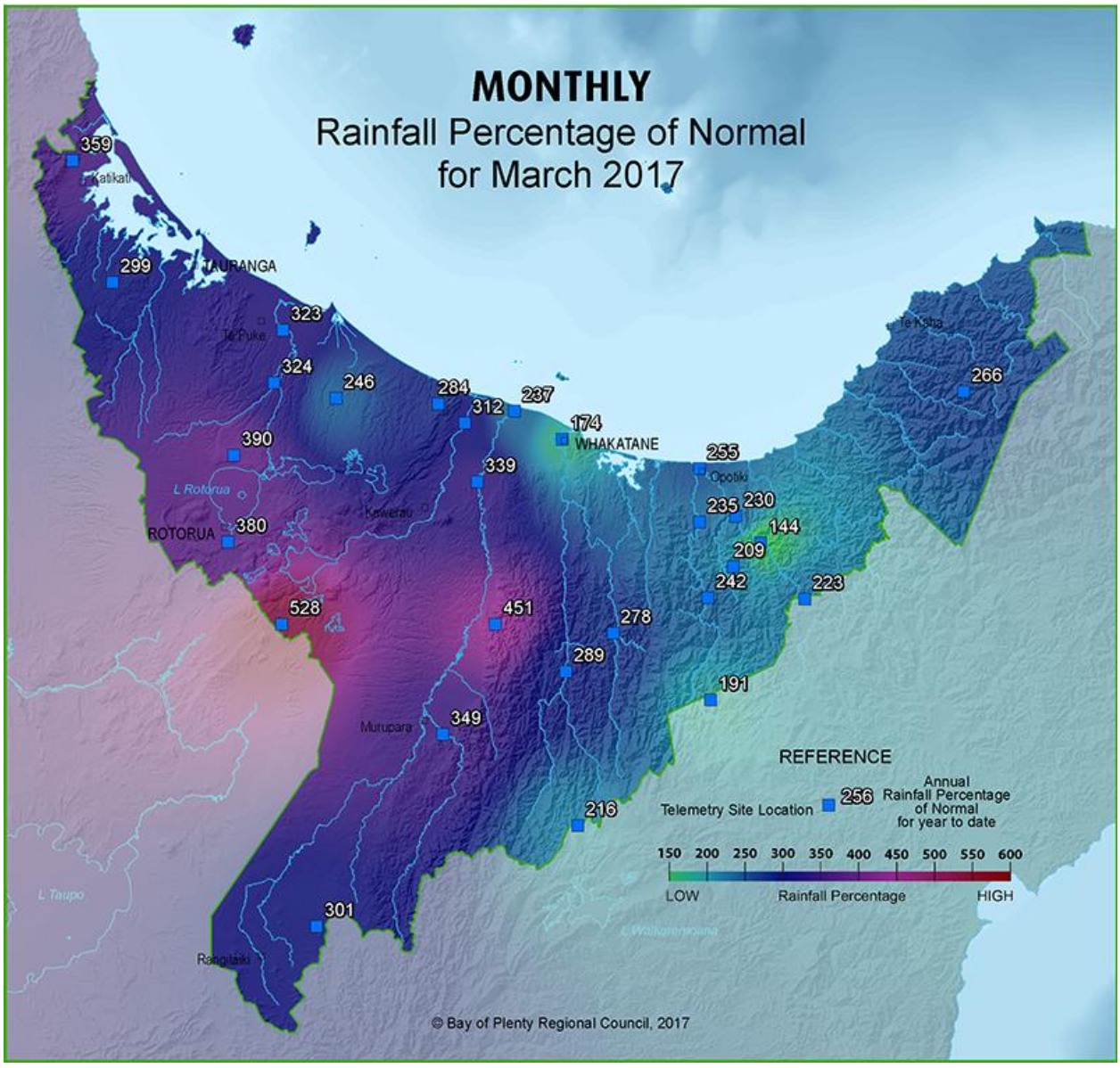


Figure 1 Indicative March 2017 percentage of normal monthly rainfall. Rainfall normal are based upon on historical data recorded at sites and as such are variable between 5-30 year duration normal.

Soil moisture levels during March were higher than long term averages and had approached or exceeded soil saturation levels, refer Appendix 1.

1.2 Synoptic description for the event of 3-7 April 2017

During Sunday 2 April a frontal system moved up the South Island, onto central New Zealand, and then stalled over the North Island on Monday 3 April. While this frontal system remained over the North Island on Tuesday 4 April, a northerly flow to the north brought a progressively warmer and more humid sub-tropical air mass (containing the remnants of Cyclone Debbie that earlier devastated parts of Queensland) down onto northern New Zealand during Tuesday 4 and Wednesday 5 April. A sub-tropical air mass such as this is significant, due to higher than normal moisture levels resulting in the potential for very heavy rain, especially when enhanced by orographic effects or convection. Heavy rain associated with this air mass spread onto the upper North Island during Tuesday and Wednesday, while a shallow low developed and then deepened on the frontal zone just west of the North Island. By the afternoon of Wednesday, the frontal zone and main rain-band (containing embedded convection/thunderstorms and localised downpours) began to move eastwards over the upper North Island. However, the main front and rain-band subsequently lingered in the Bay of Plenty region for several hours as the associated low deepened and moved onto central New Zealand Wednesday night. Very heavy rain in the region eventually eased overnight Wednesday as the low moved southeast, with a westerly flow spreading onto the North Island clearing the main front and sub-tropical air mass off to the east.

A drier west to southwest flow then persisted over the upper North Island during Thursday 6 April and Friday 7 April.

Synoptic maps provided by the MetService are provided in Appendix 2. These maps are the operational maps developed on the day as used as part of forecast development.

MetService Special Weather Bulletins with filtered content that relate to the Bay of Plenty region are provided in Appendix 4.

1.3 Synoptic description for the event of 10-13 April 2017 – Cyclone Cook

1.3.1 Synoptic Description

Cyclone Cook was named at midnight on Saturday 8 April by Regional Specialised Meteorological Centre - Nadi, as the system crossed northern Vanuatu. During the next two days, Cook strengthened to a Severe Category 3 cyclone and crossed New Caledonia during the evening of Monday 10 April. After this, the cyclone curved to the southeast and tracked towards waters north of New Zealand during Tuesday 11 April and Wednesday 12 April, refer Figure 2. As Cook exited the tropics, the cyclone encountered vertical wind shear and transformed into an extra-tropical system, being re-classified at midday on Wednesday by MetService.

At the same time as Cook was exiting the Tropics, a complex low pressure system and associated fronts moved across the Tasman Sea, spreading heavy rain into the west and north of the country late Tuesday and during Wednesday (reaching Bay of Plenty Wednesday afternoon). The Tasman low and its main frontal band extending to the north, both stalled just west of the country during Wednesday, dragging humid north-easterlies and periods of rain onto the North Island that persisted into Thursday 13 April as Cook approached from the north.

During Thursday, Cook tracked towards central Bay of Plenty, eventually passing west of White Island to make landfall between Te Puke and Whakatāne where the MetService automatic weather station at Whakatāne airport recorded a minimum

pressure of 982hPa before losing power. Cook continued southwards across the North Island overnight Thursday, with strong winds and heavy rain easing quickly following its passage.

During Friday 14 April, a showery northwest flow spread onto the North Island as Cook continued to track southwards just offshore from the east of the South Island.

Synoptic maps provided by the MetService are provided in Appendix 3. These maps are the operational maps developed on the day and used as part of forecast development.

MetService Special Weather Bulletins with filtered content that relate to the Bay of Plenty region are provided in Appendix 4.

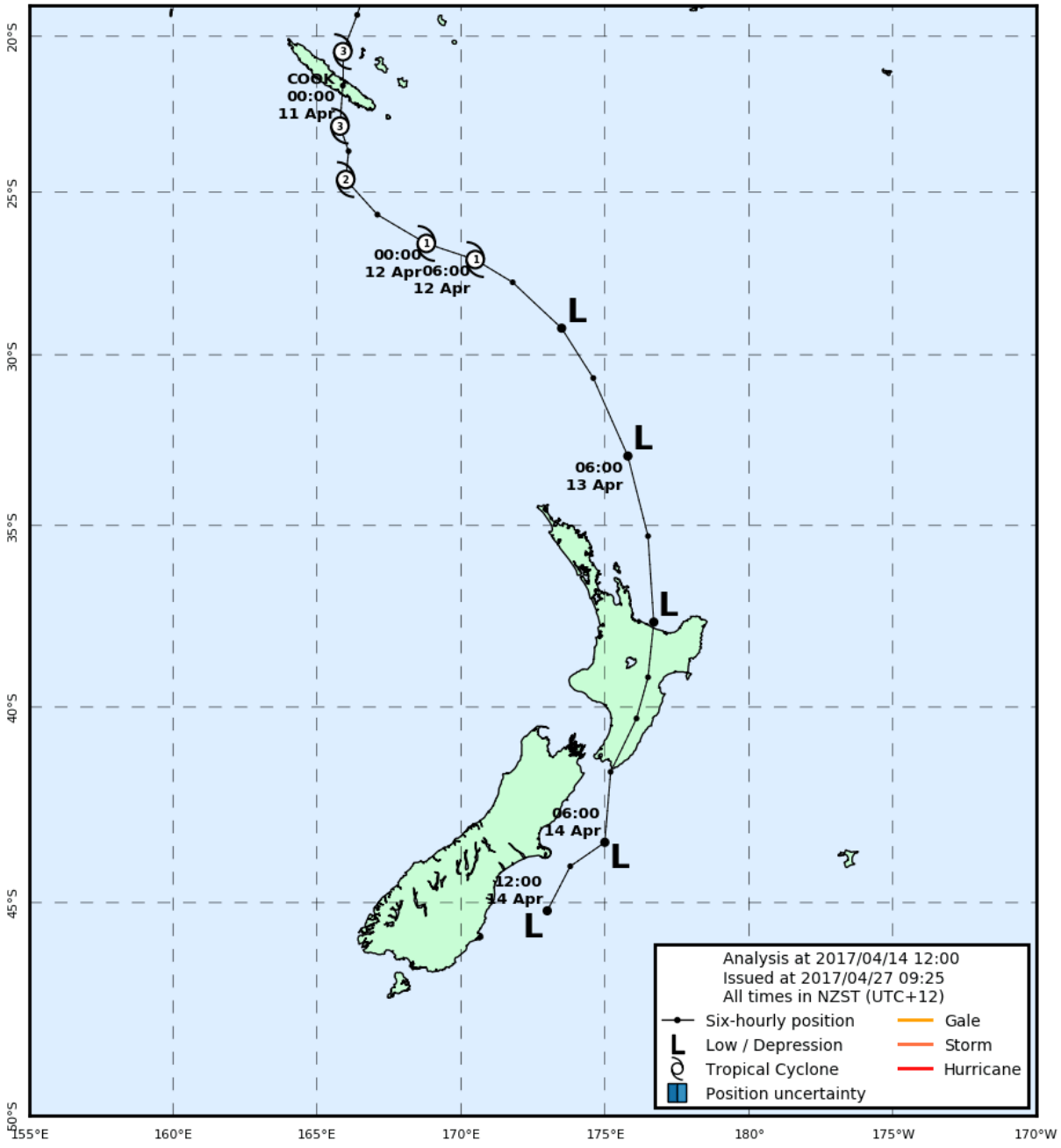


Figure 2 Cyclone Cook's track over the North Island and east of the South Island.

Part 2: Recorded and analysed data

The recorded data used for presentation and analysis within this report was the best data available at the time of production and may change into the future as it undergoes validation checks and passes through quality control processes.

2.1 Event 3-7 April 2017

2.1.1 Rainfall

Wide spread rainfall was experienced throughout the Bay of Plenty generally starting late on the 3 April and finishing early on the 6 April. Rainfall data was collected from the 42 Bay of Plenty Regional Council sites and supplemented by 3 rainfall sites source from NIWA and Trustpower.

Maximum recorded 48 hour rainfall totals recorded by Bay of Plenty Regional Council rain gauges are provided in Figure 3.

Plots of the rainfall for the Whakatāne, Rangitāiki and Kaituna catchments (Appendices 5-7) indicate multiple distinct bands of rain occurring, with the last band starting in the afternoon of 5 April having some particularly high intensity rainfall. Maximum 1 hour peak intensities (Figure 4) indicate that the highest intensities were present in the mid to low Whakatāne and Rangitāiki catchments.

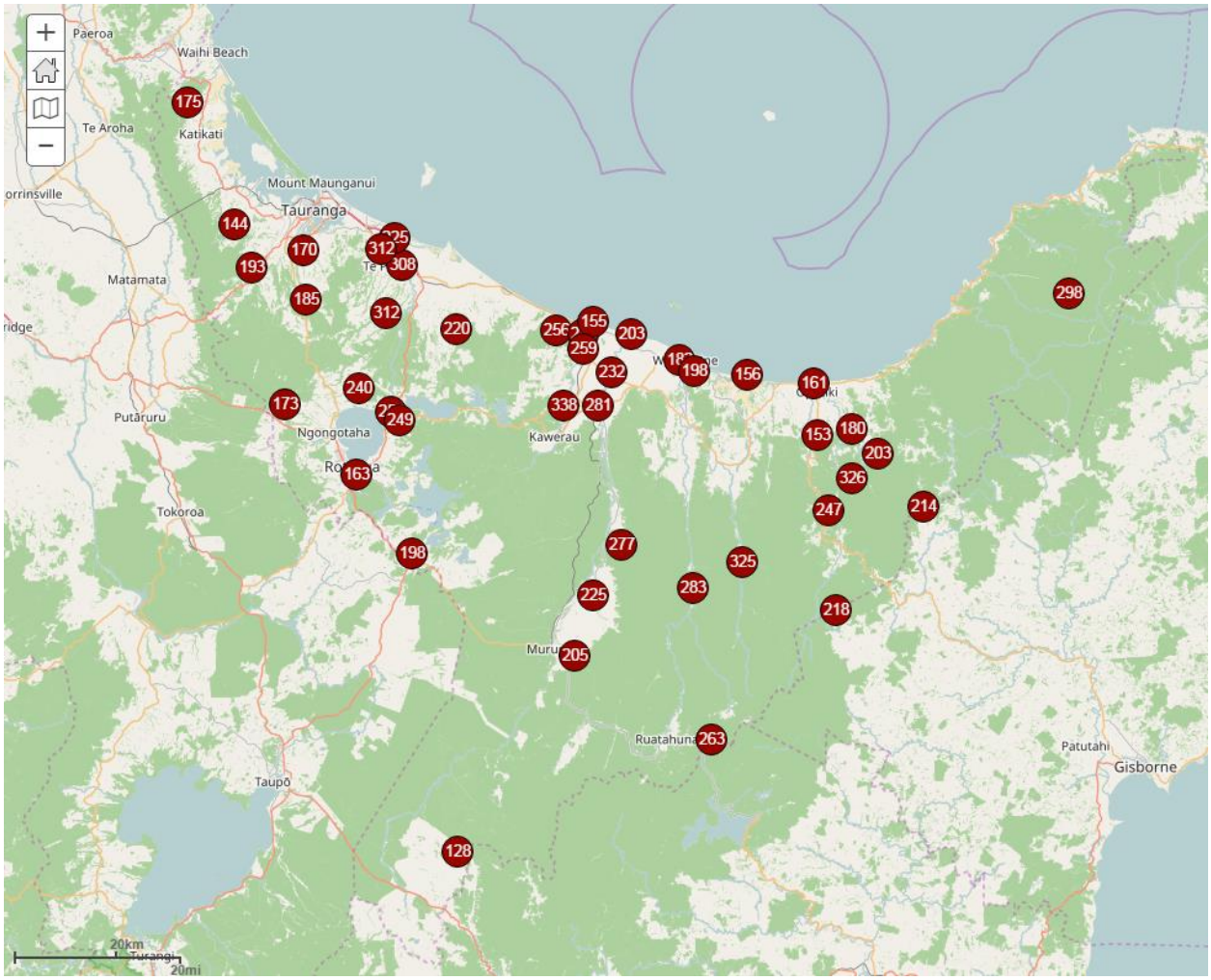


Figure 3 Maximum 48 hour rainfall totals in the period 3-7 April 2017.

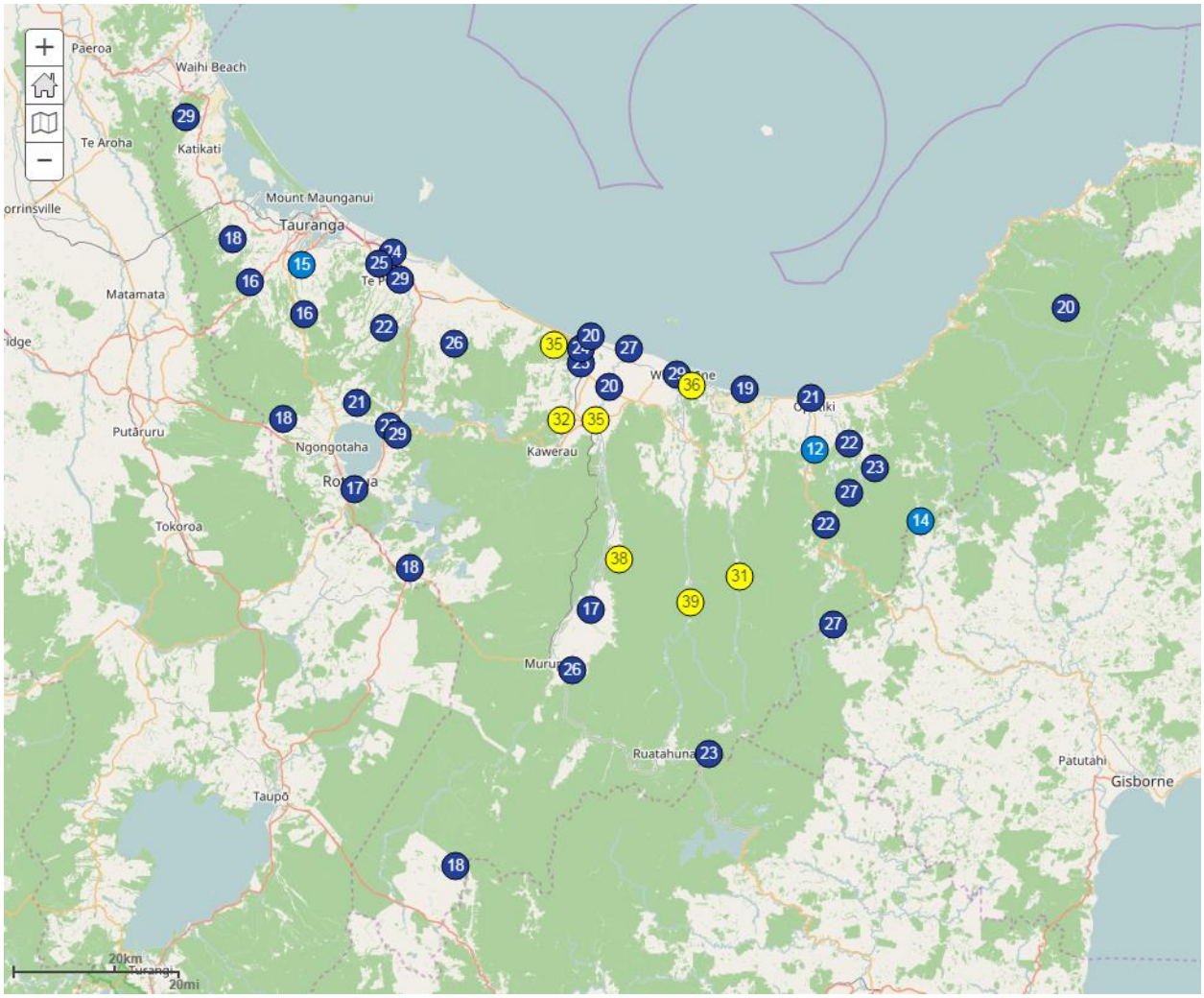


Figure 4 Maximum 1 hour rainfall totals in the period 3-7 April 2017.

2.1.2 River Levels

During the event significant river levels occurred due to the antecedent saturated catchment conditions and high rainfall experienced. Primarily the most significant high river levels were evident in the Whakatāne and Rangitāiki catchments with a number of sites experiencing their highest ever recorded level; refer Table 1 and Figures 5-7.

River levels provided are in terms of local recorder datum.

Table 1 River Level Summary (levels in terms of local recorder datum).

Location	Catchment	3-7 April 2017		Prior Highest Peak		Records start
		River level (m)	Date	River level (m)	Date	Date
Waioeka at Cableway	Waioeka	8.371	5-Apr-17	10.668	11-Mar-64	1-Mar-79
Otara at Browns Bridge	Otara	3.811	6-Apr-17	5.112	4-Oct-03	28-Apr-86
Whakatāne at Huitieke	Whakatāne	4.258	5-Apr-17	3.379	29-Jan-11	1-Oct-50

Location	Catchment	3-7 April 2017		Prior Highest Peak		Records start
		River level (m)	Date	River level (m)	Date	Date
Tauranga (Waimana) River at Gorge	Whakatāne	7.85	6-Apr-17	7.163	11-Mar-64	19-Feb-07
Whakatāne at Rūātoki	Whakatāne	5.236	6-Apr-17	4.595	29-Jan-11	31-Jul-56
Whakatāne at Valley Road (NIWA)	Whakatāne	8.354	6-Apr-17	7.715	18-Jul-04	14-Jan-86
Whakatāne at Town Wharf	Whakatāne	3.773	6-Apr-17	4.046	17-Jul-04	1-Mar-79
Whirinaki at Galatea (NIWA)	Rangitāiki	4.363				3-Dec-52
Rangitāiki at Murupara	Rangitāiki	*Trust Power*				1-Jun-48
Rangitāiki at Aniwhenua	Rangitāiki	*Trust Power*				20-Dec-88
Waihua at Gorge	Rangitāiki	*Trust Power*				20-Dec-79
Rangitāiki at Te Teko (NIWA)	Rangitāiki	6.579	6-Apr-17	6.397	18-Jul-04	2-Jun-48
Tarawera at Awakaponga	Tarawera	2.829	6-Apr-17			28-May-48
Kaituna at Te Matai	Kaituna	4.189	5-Apr-17	4.721	1-May-99	2-May-55

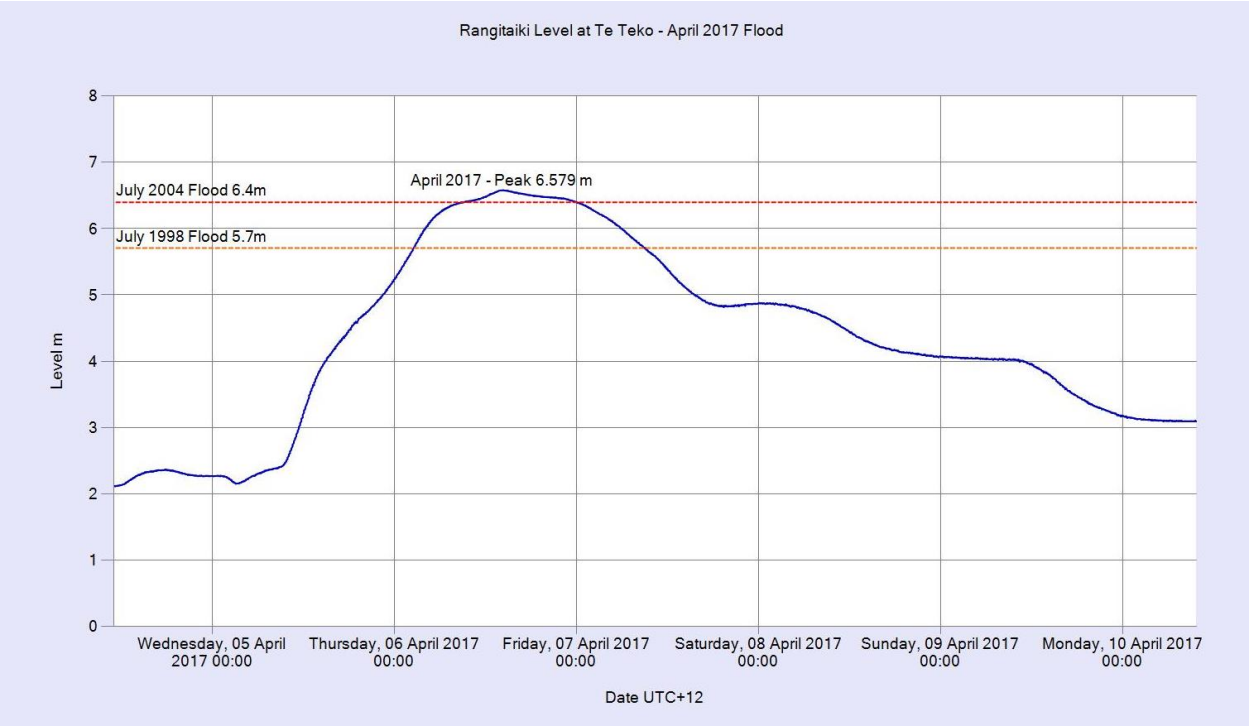


Figure 5 Rangitaiki at Te Teko river level.

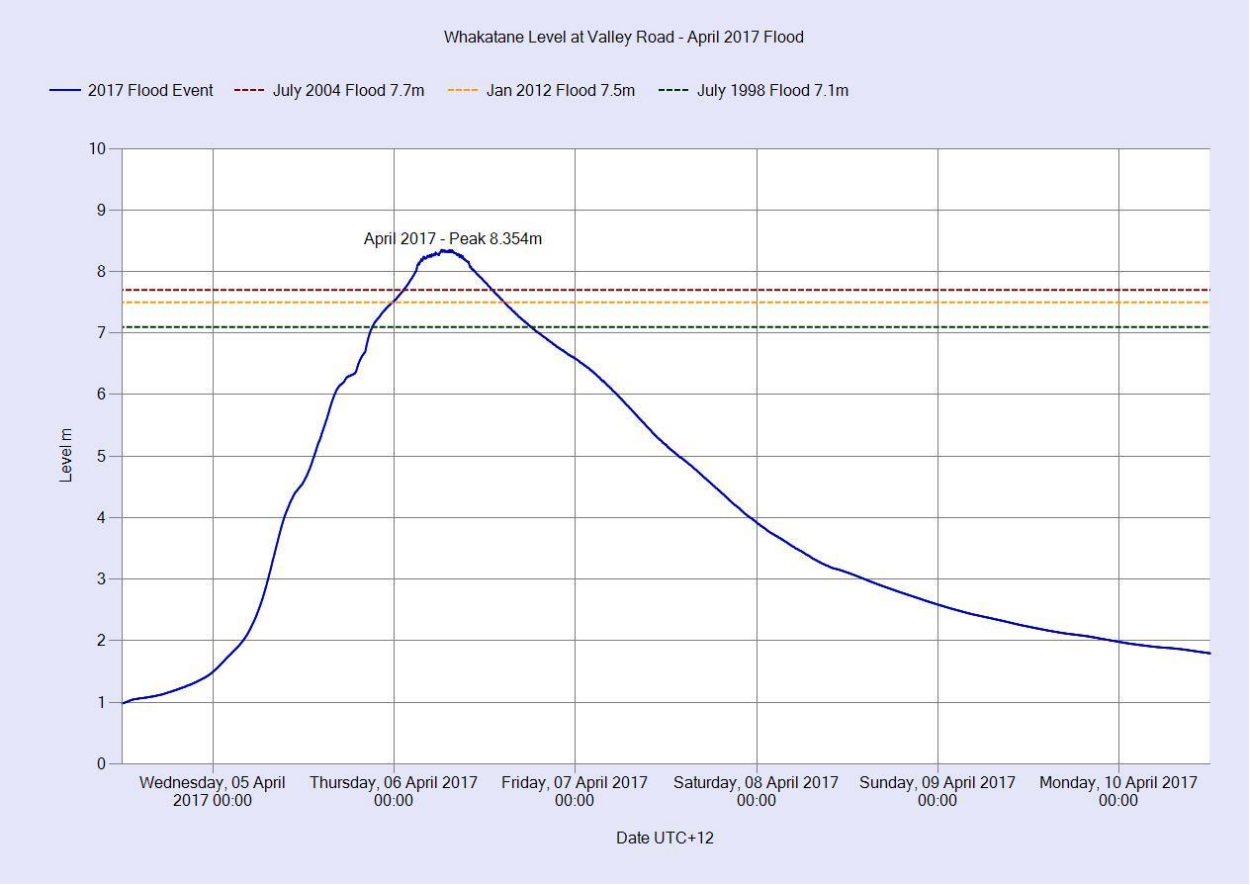


Figure 6 Whakatane at Whakatane (Valley Rd.) river level

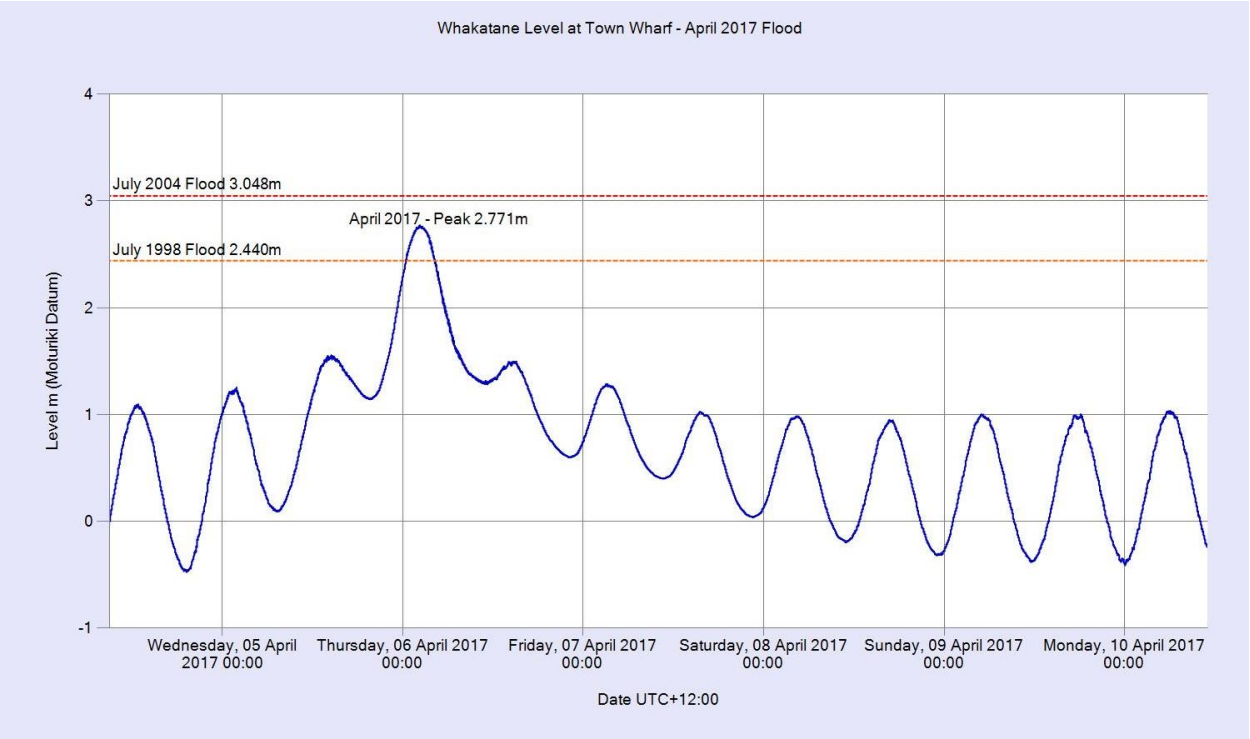


Figure 7 Whakatane at Wharf river level

2.1.3 River Flows

During the event significant river flows occurred due to the saturated antecedent catchment conditions and high rainfall experienced. Primarily the most significant high river flows were evident in the Whakatāne and Rangitāiki catchments with a number of sites experiencing highest ever recorded flow; refer Table 2 and Figures 8-9.

Table 2 River Flow Summary.

Location	Catchment	Apr-2017			Prior Highest Peak	
		River flow (m^3/s)	ARI (years)	Date	River flow (m^3/s)	Date
Waioeka at Cableway	Waioeka	1288	*20*	5-Apr-17	1520	5-Jul-98
Otara at Browns Bridge	Otara	281	*1.6*	6-Apr-17	727	4-Oct-03
Whakatāne at Valley Road	Whakatāne	3874[1]	*1.37 x Q_{100}*	6-Apr-17		18-Jul-04
Whirinaki at Galatea	Rangitāiki	470[2]	*1.25 x Q_{100}*			
Rangitāiki at Murupara	Rangitāiki	*Trust Power*[3]	*TBD*			
Rangitāiki at Aniwhenua	Rangitāiki	*Trust Power*	*TBD*			
Waihua at Gorge	Rangitāiki	*Trust Power*	*TBD*			

[1] Preliminary flow figure only. Additional overflow spill volumes are not included in this figure but have been taken into account in estimation of ARI figure.
[2] Recorder was washed out during flood event but assumption that peak was captured before this occurred.
[3] Awaiting suitable data supply contract with Trustpower.

Location	Catchment	Apr-2017			Prior Highest Peak	
		River flow (m^3/s)	ARI (years)	Date	River flow (m^3/s)	Date
Rangitāiki at Murupara	Rangitāiki	*Trust Power*	*TBD*			
Rangitaiki inflow to Lake Matahina	Rangitaiki	900[4]	Q_{100}	6-Apr-17		
Rangitāiki at Te Teko	Rangitāiki	741	$0.92 \times Q_{100}$	6-Apr-17	770	18-Jul-04
Tarawera at Awakaponga	Tarawera	85	*40*	6-Apr-17	92	2-Jun-62
Kaituna at Te Matai	Kaituna	164	*5*	5-Apr-17	377	1-Jun-62

[4] Modelled flow figure.

Figure 8 Rangitaiki at Te Teko flow

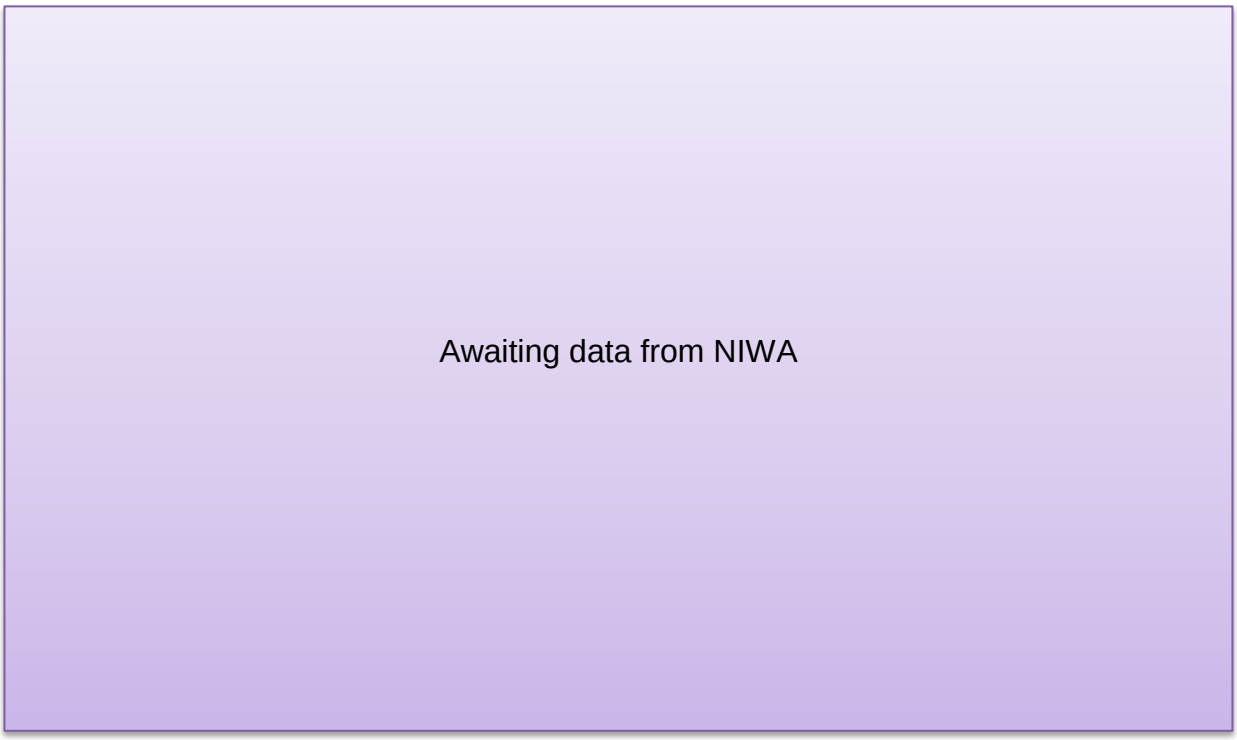


Figure 9 Whakatane at Valley Road flow

2.2 10-13 April 2017 – Cyclone Cook

2.2.1 Wind Speed

Being such a compact system, Cyclone Cook had a limited swath of intense, damaging winds that significantly impacted the Bay of Plenty region in the afternoon and evening of 13 April. The strongest winds where located along the eastern side of the weather system as it passed.

Due to the saturated conditions form the preceding event and the strong winds a significant number of trees were uprooted and power lines damaged contributing to widespread power outages and property damage.

Maximum wind speed gust recorded by Bay of Plenty Regional Council gauges was 106 km/h at the Ōhiwa Spit meteorological station, refer Figure 10.

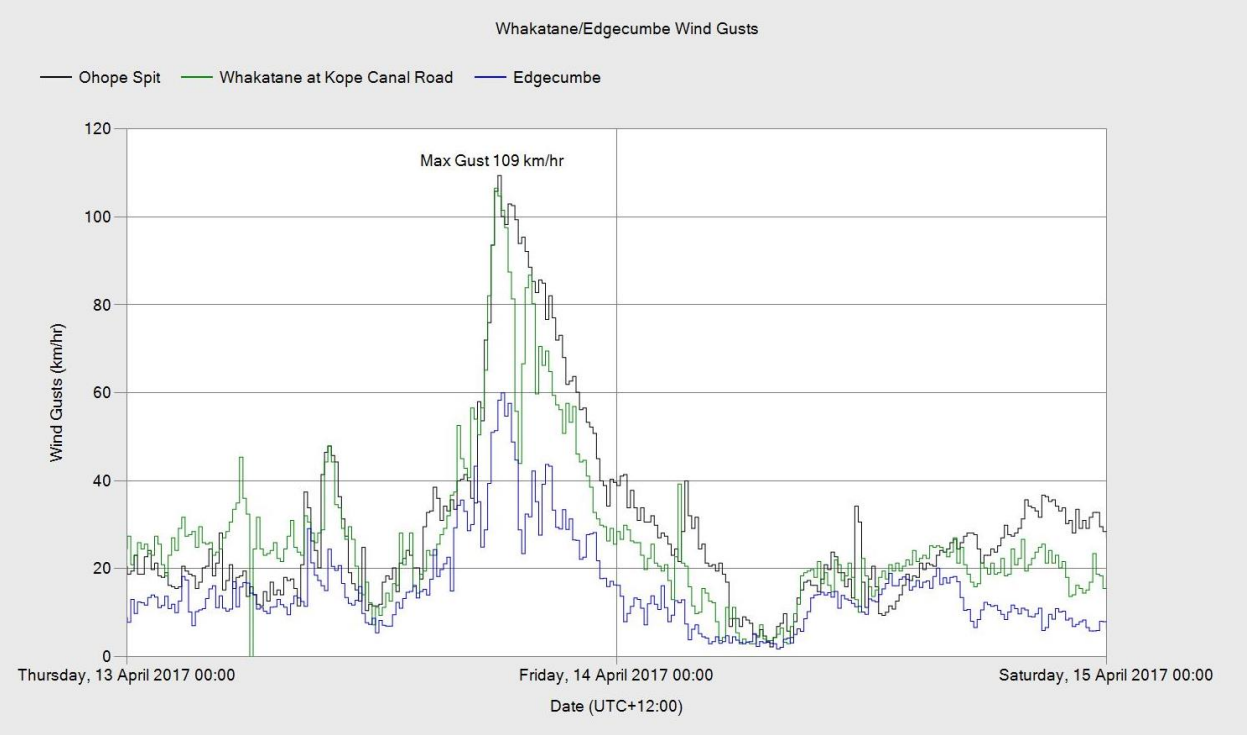


Figure 10 Recorded wind gusts.

MetService weather stations recorded wind gusts of:

- 209 km/h at White Island,
- 100 km/h Whakatāne, before the weather station lost power just prior to Cyclone Cook making landfall.
- 90 km/h at Tauranga.

2.2.2 Barometric Pressure

Cyclone Cook made landfall with a central pressure of 980hPa being recorded at the MetService Whakatāne airport gauge.

Regional Council gauges showed pressure minimums that support the figures recorded by the MetService, refer Figure 11.

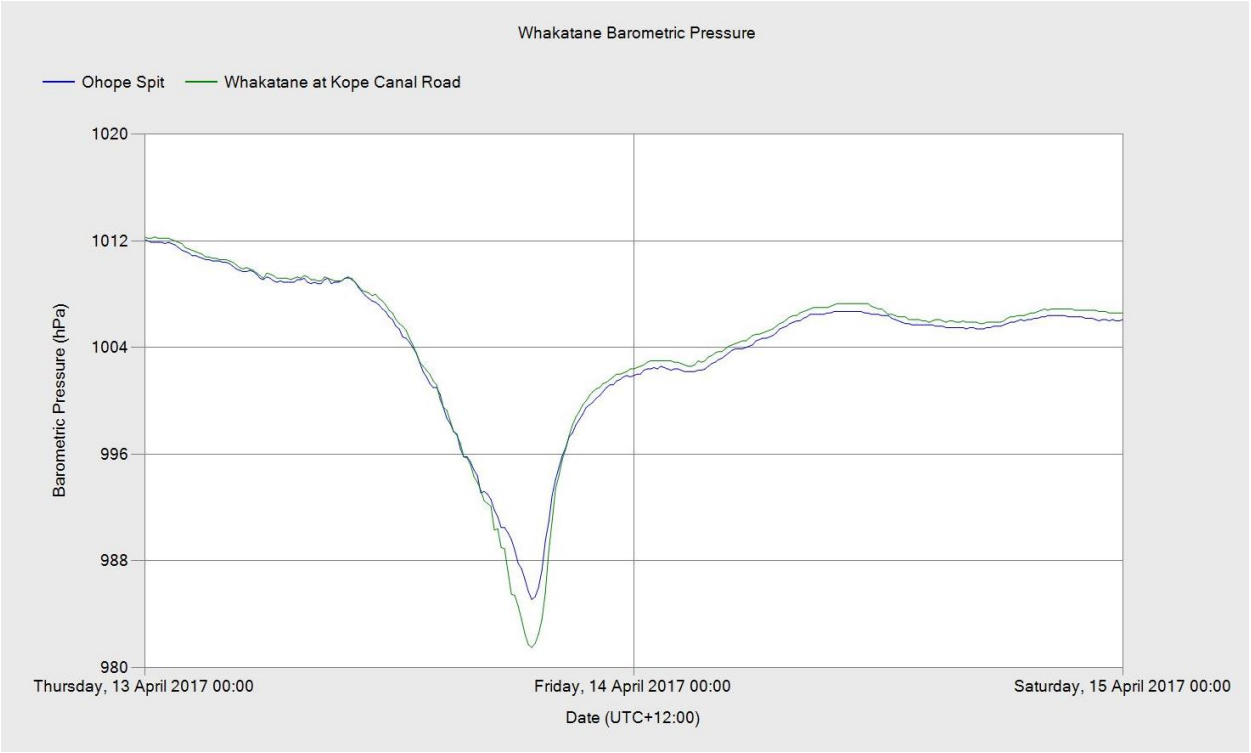


Figure 11 Barometric pressure.

2.2.3 Air Temperature

Air temperatures recorded over the period of the Cyclone Cook event show sustained temperatures between 15-20 degrees celsius as the humid sub-tropical air contained in the system passed over the region, refer Figure 12.

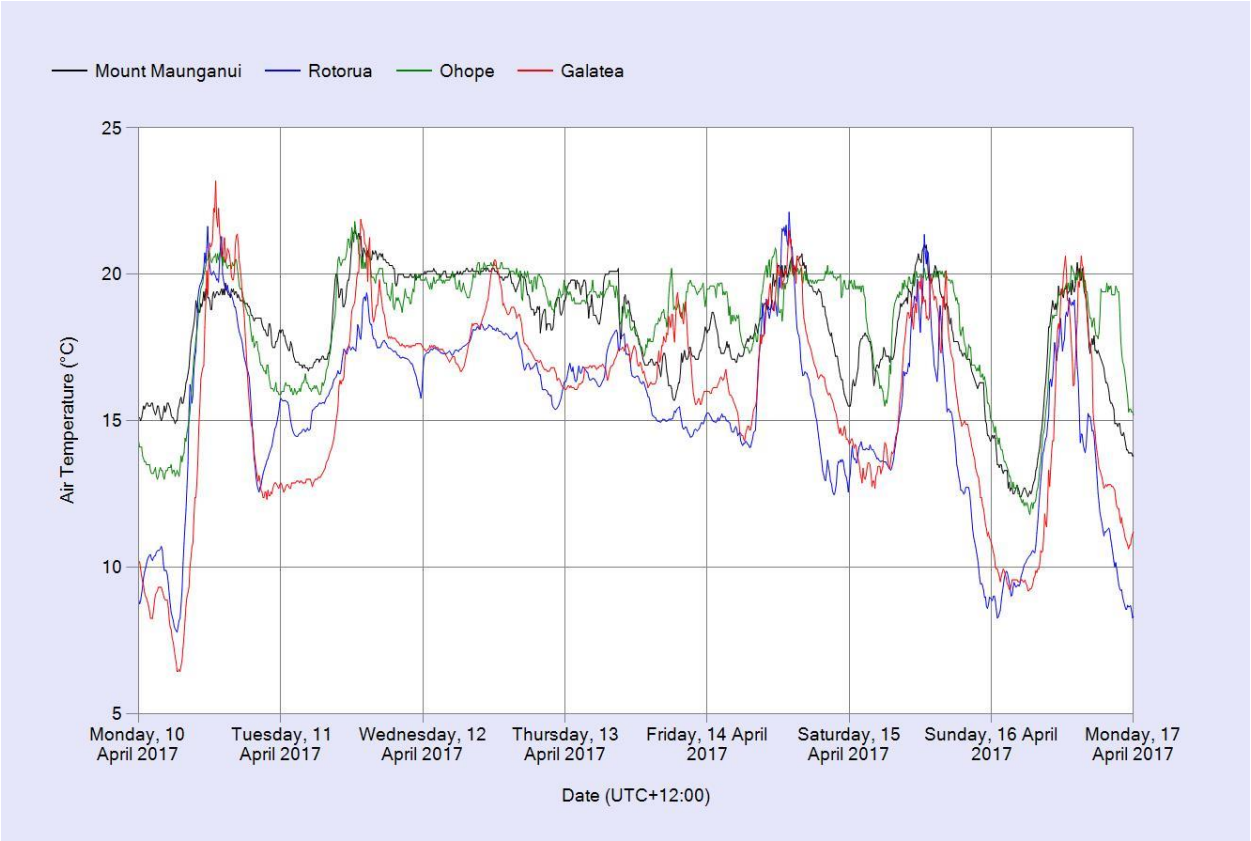


Figure 12 Cyclone Cook air temperatures.

2.2.4 Rainfall

Rainfall totals resulting from Cyclone Cook event were most significant in the Western Bay of Plenty region where a maximum 48 hour rainfall total of 225mm was recorded, refer Figure 13.

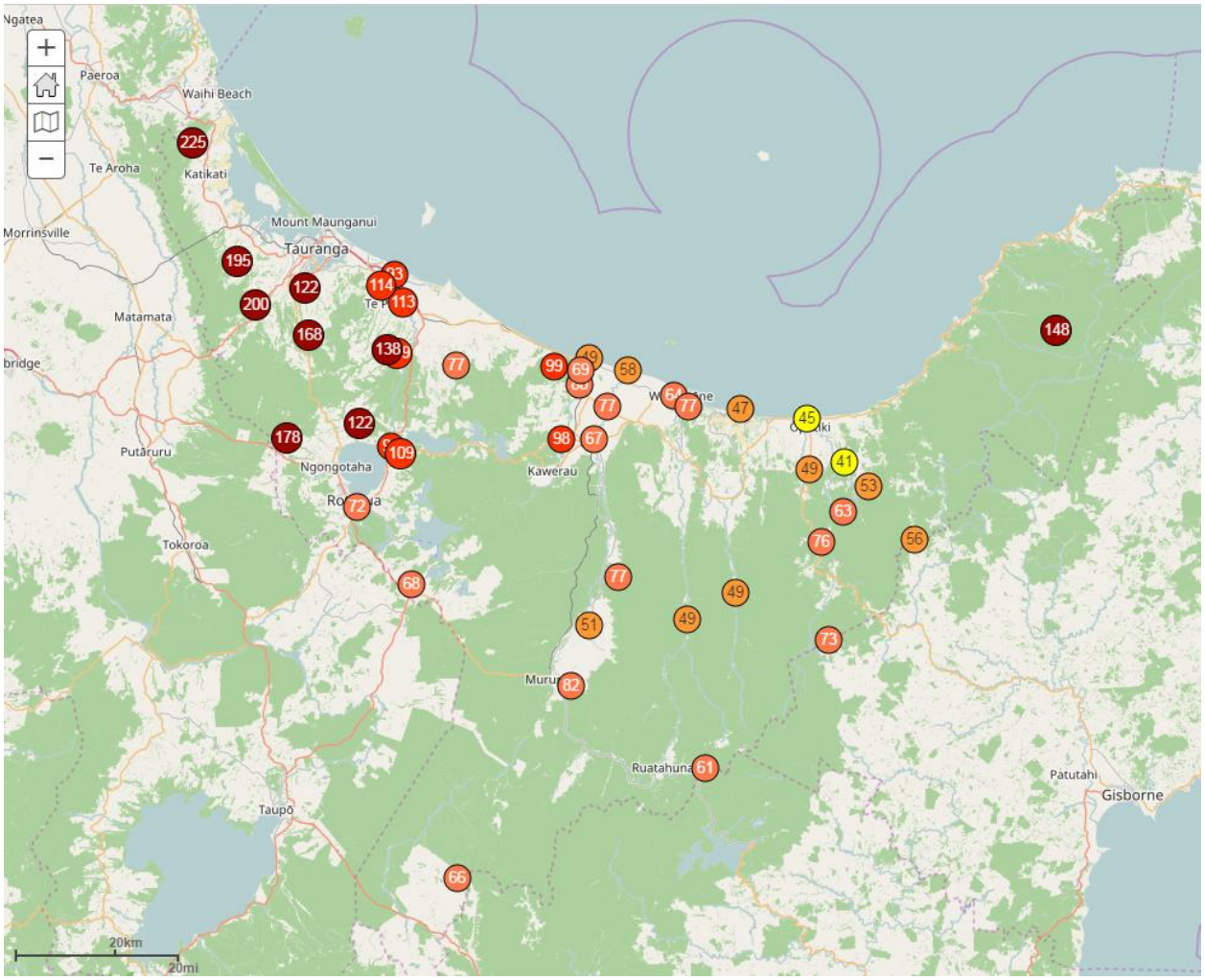


Figure 13 Maximum 48 hour rainfall totals 10-13 April 2017

2.2.5 River levels and flows

River response to rainfall was relatively minor with of the river schemes only the Kaituna catchment having a first level warning issued. Other rivers did experience moderate rises but these were of less significance compared to those earlier in the month.

2.2.6 Wave buoy

Council has a wave buoy located 13 km off shore from Pukehina in 62 m of water, in a central position within the curve of the Bay of Plenty.

Significant increase in wave heights were experienced by the wave buoy as cyclone Cook passed across the region. An hourly peak wave height of 12.43 m was recorded on 13 April at 18:00, Figure14.

Recorded data from the wave buoy was reviewed by Ocean Data Systems Ltd. who are the supply agents for the buoy with a determination that everything on the buoy

was operational and that there is no reason for not believing the recorded wave heights.

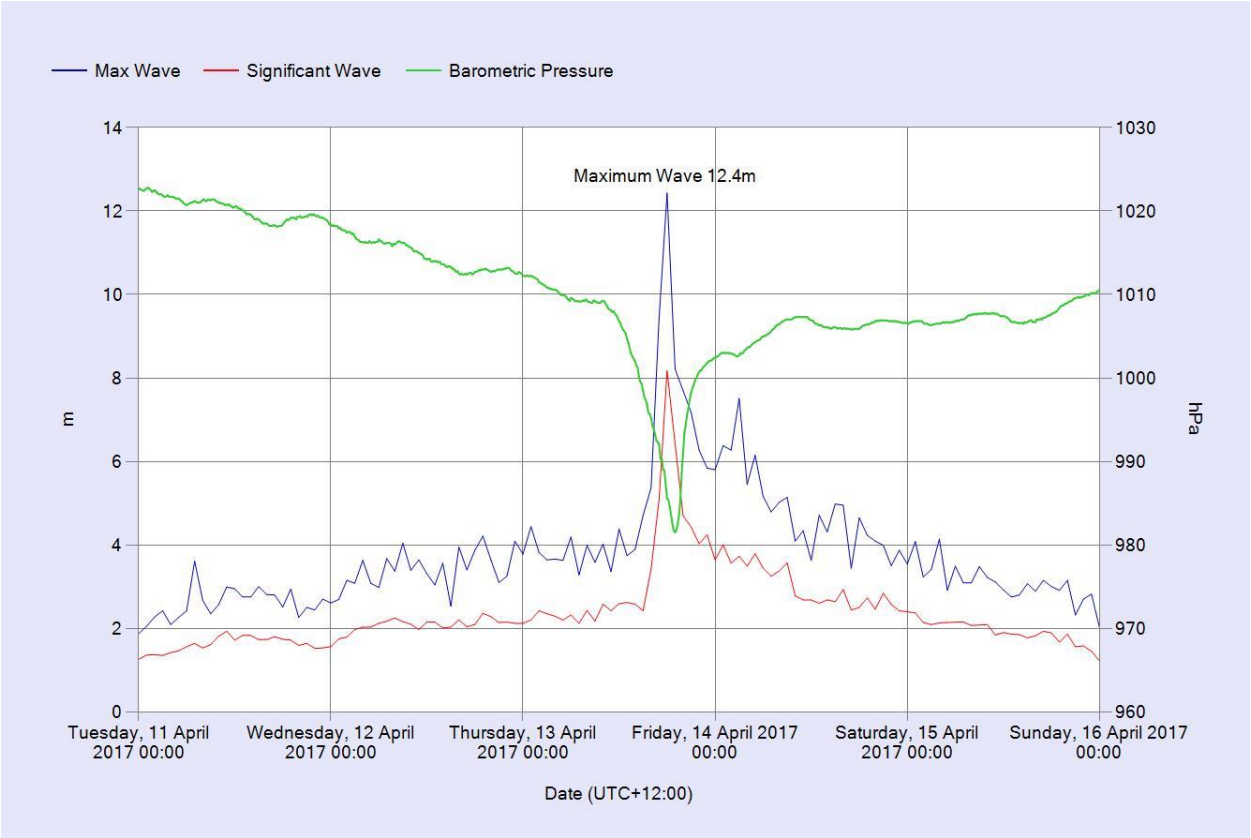
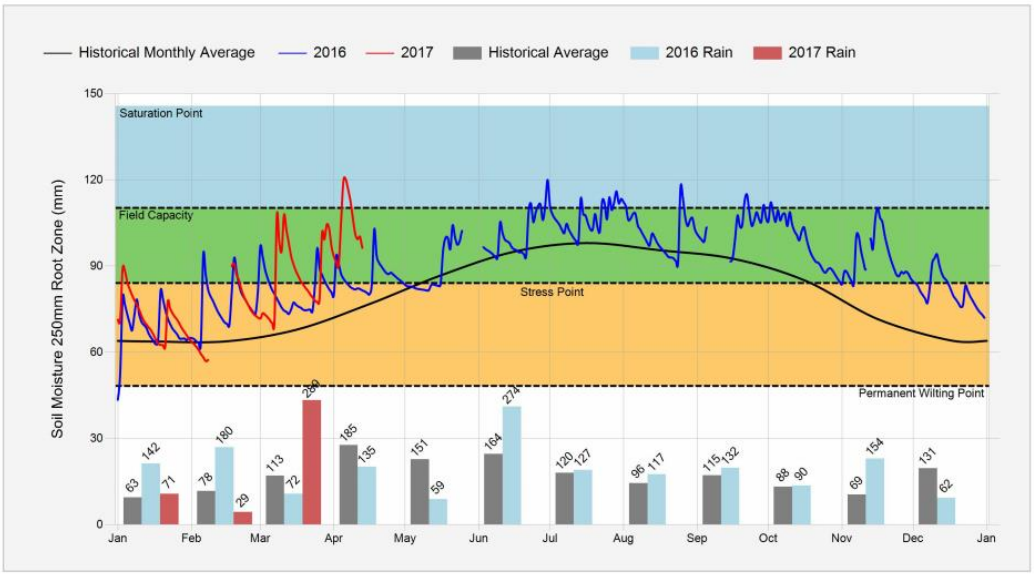


Figure 14 Wave heights from wave buoy with corresponding barometric pressure.

Appendix 1: Representative Soil Moisture Levels

Daily Soil Moisture Averages and Monthly Rainfall Totals

Site Name:	Rangitaiki Plains at Flax Road		
Location Identifier:	JM124696	Location (NZTM):	1931246 5796969
Parameter:	Soil Moisture	Elevation:	2



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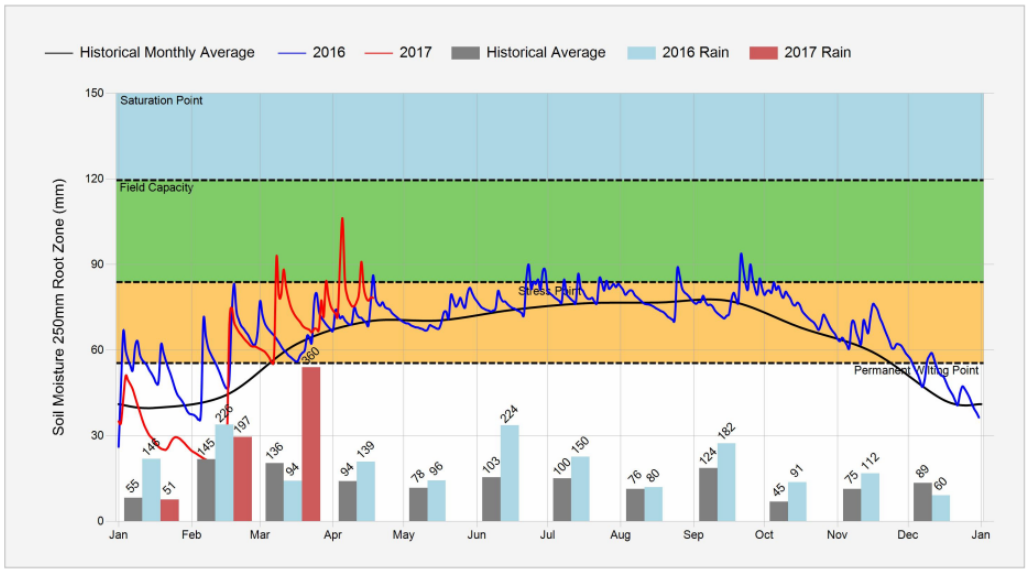
Daily Soil Moisture Averages and Monthly Rainfall Totals

Site Name:	Raparapahoe at Collins Lane		
Location Identifier:	FO210518	Location (NZTM):	1892106 5815189
Parameter:	Soil Moisture	Elevation:	7
Start Time:	2014-11-19 12:00:00	End Time:	2017-04-19 08:00:00
Units:	%	Total Data Points:	85,293



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Appendix 2: Synoptic Maps 3-7 April 2017 Event

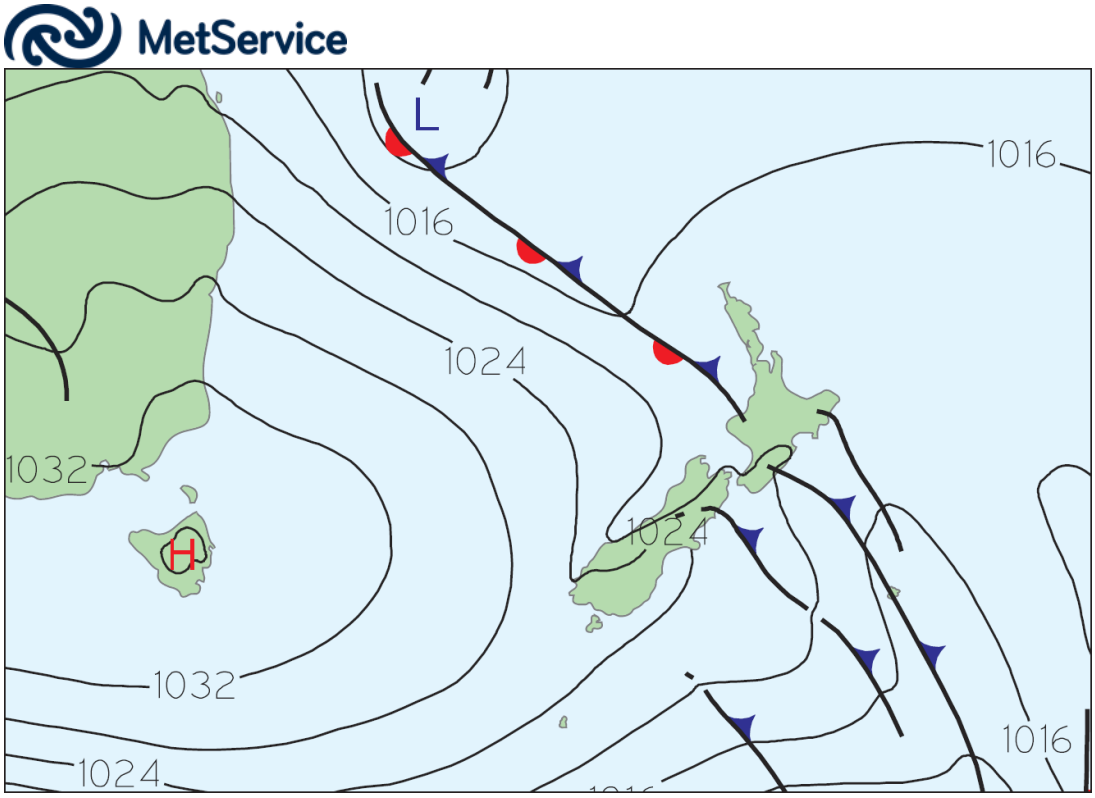


Figure 15 3 April 2017 1200 NZST.

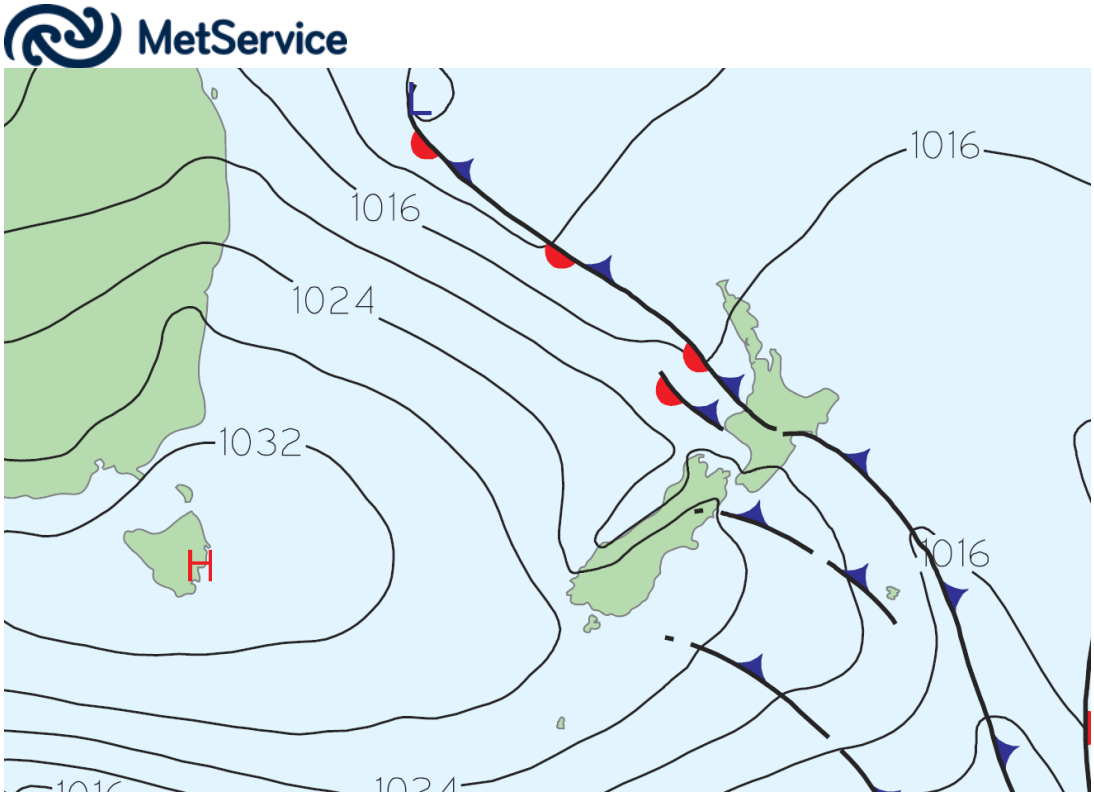


Figure 16 3 April 2017 1800 NZST.

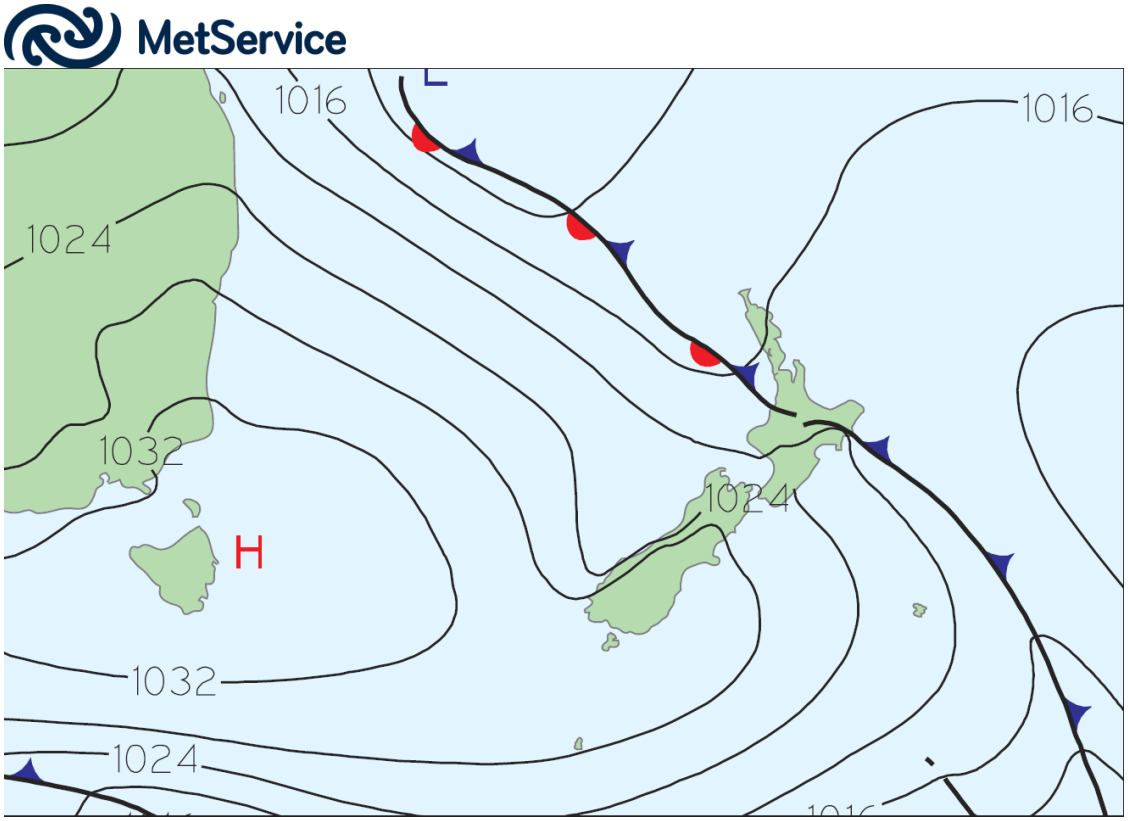


Figure 17 4 April 2017 0000 NZST.

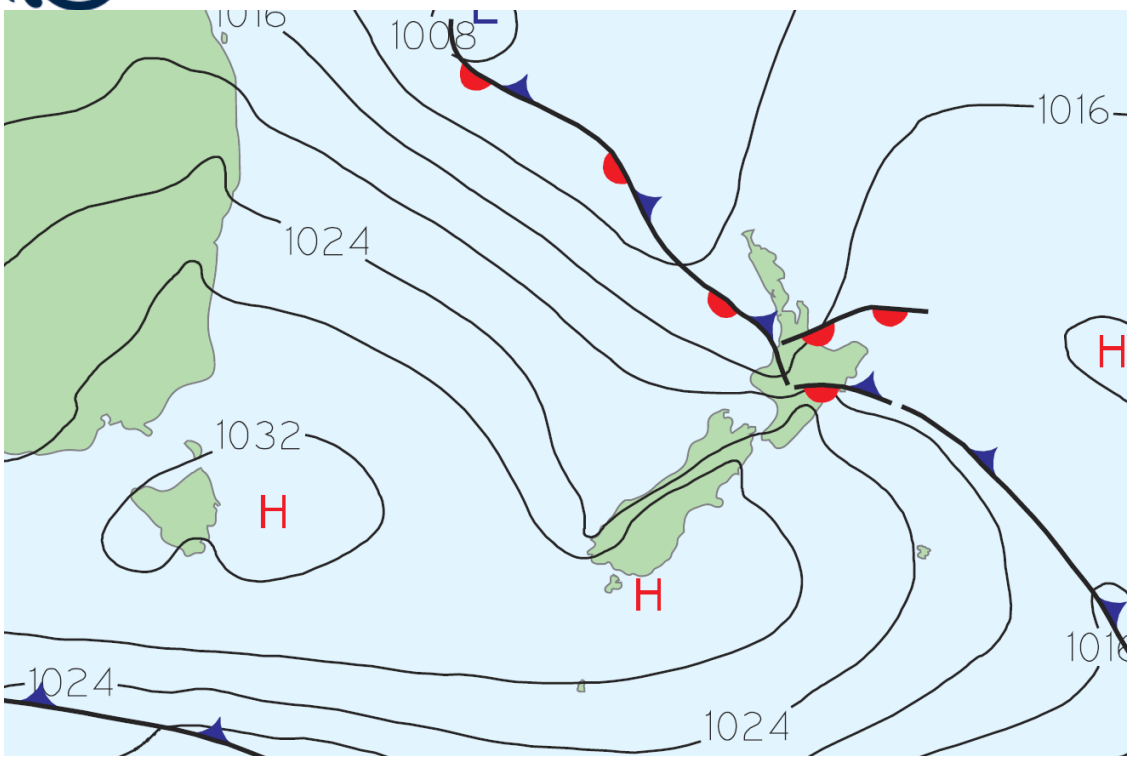


Figure 18 4 April 2017 0600 NZST.

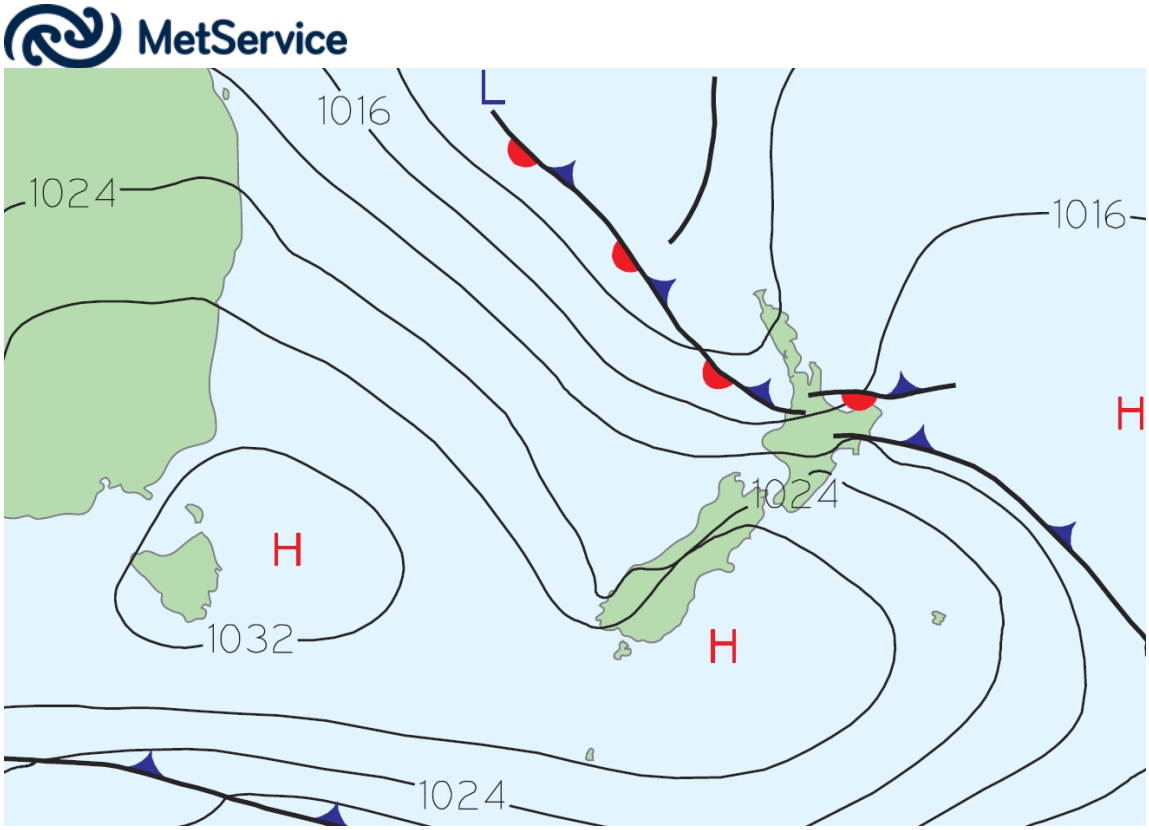


Figure 19 4 April 2017 1200 NZST.

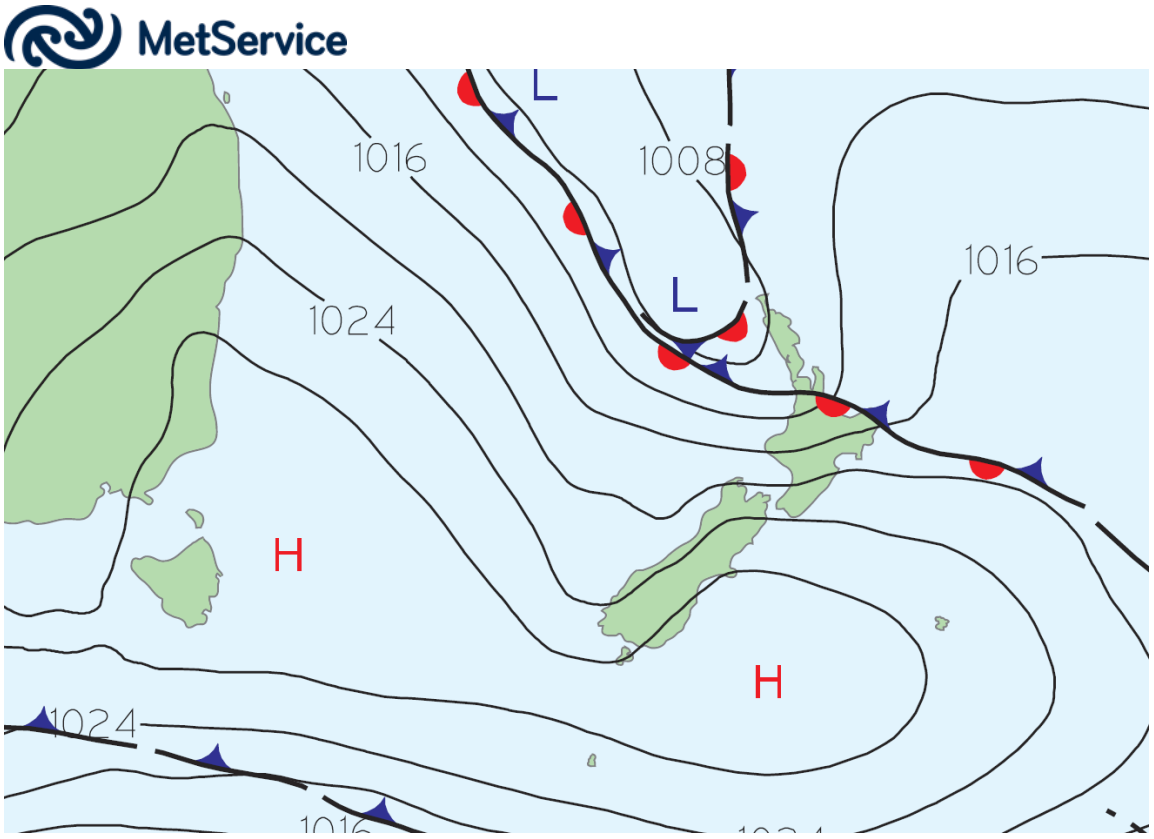


Figure 20 4 April 2017 1800 NZST.

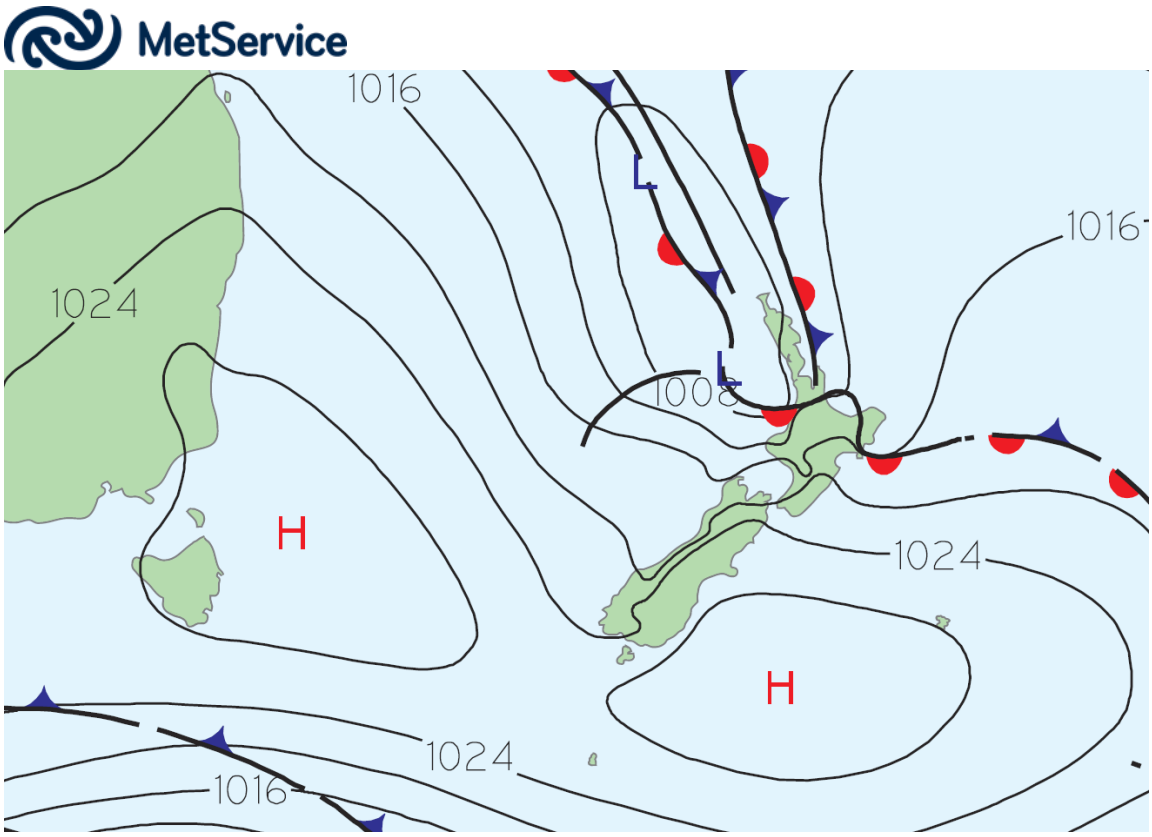


Figure 21 5 April 2017 0000 NZST.

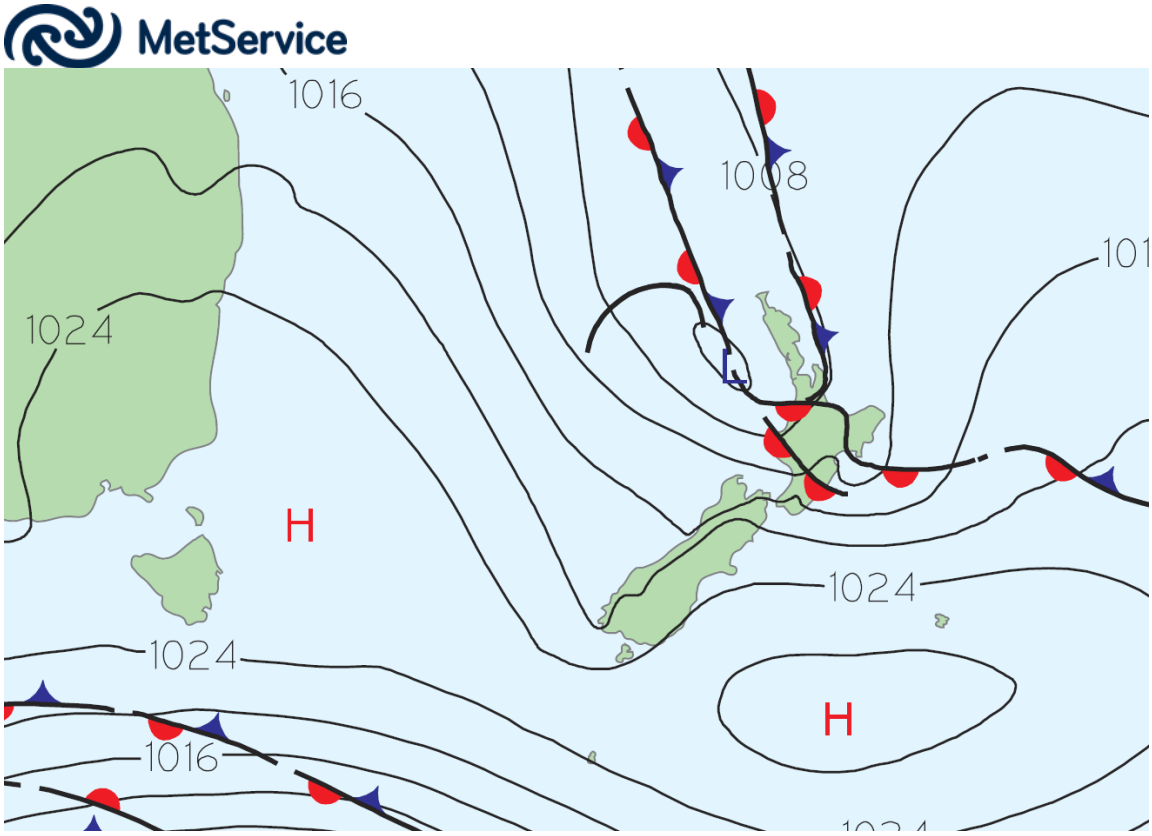


Figure 22 5 April 2017 0600 NZST.

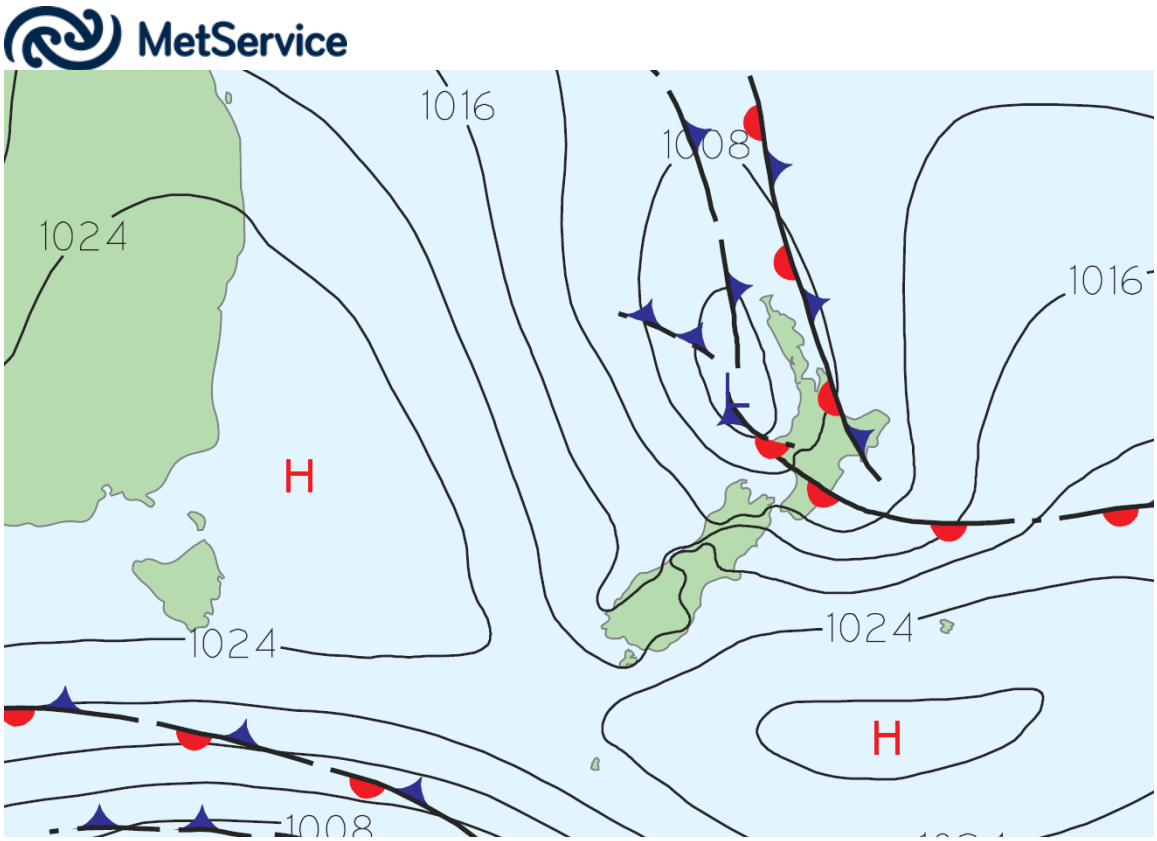
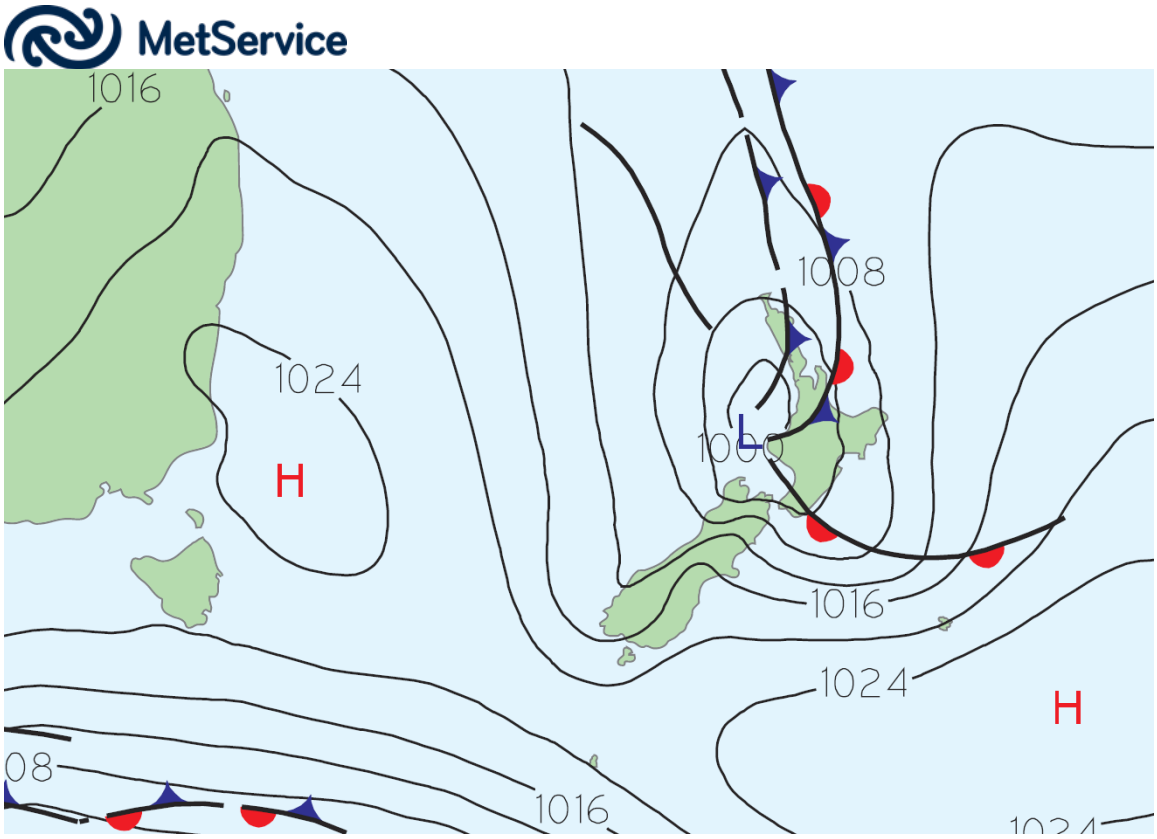


Figure 23 5 April 2017 1200 NZST.



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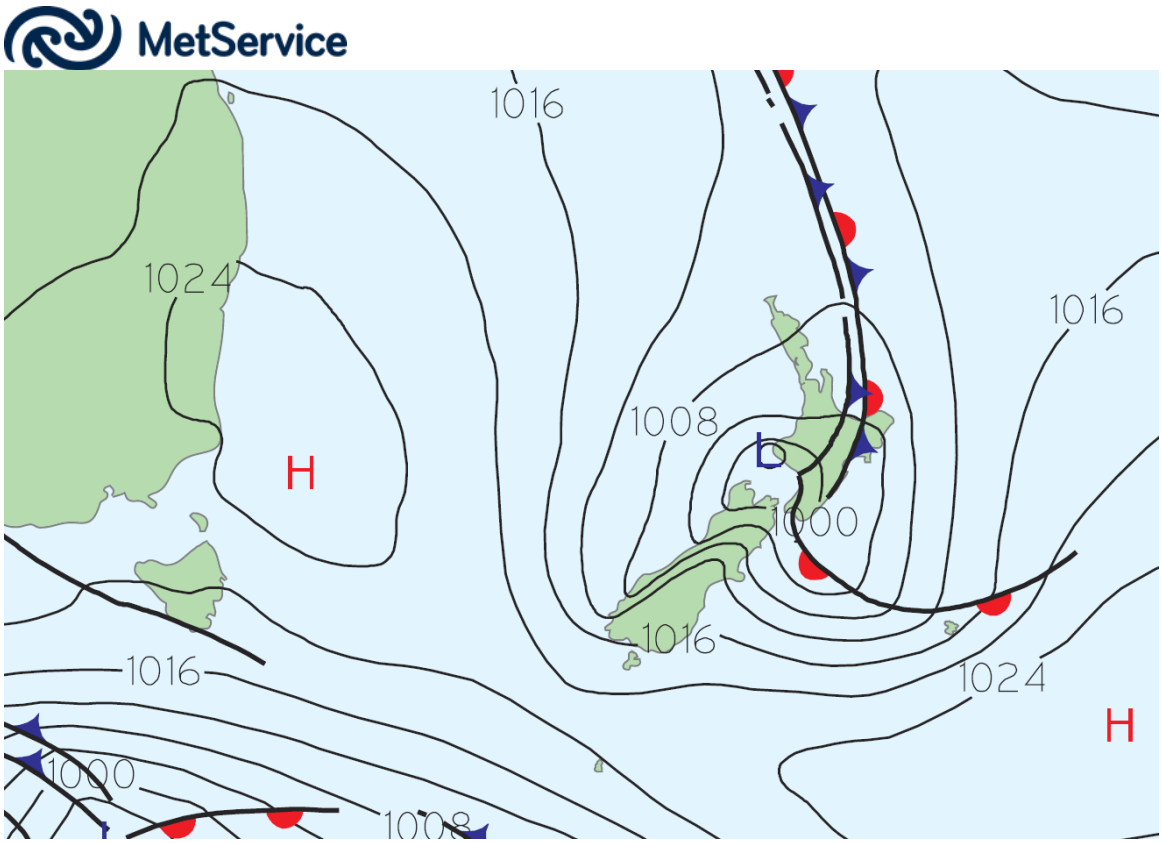
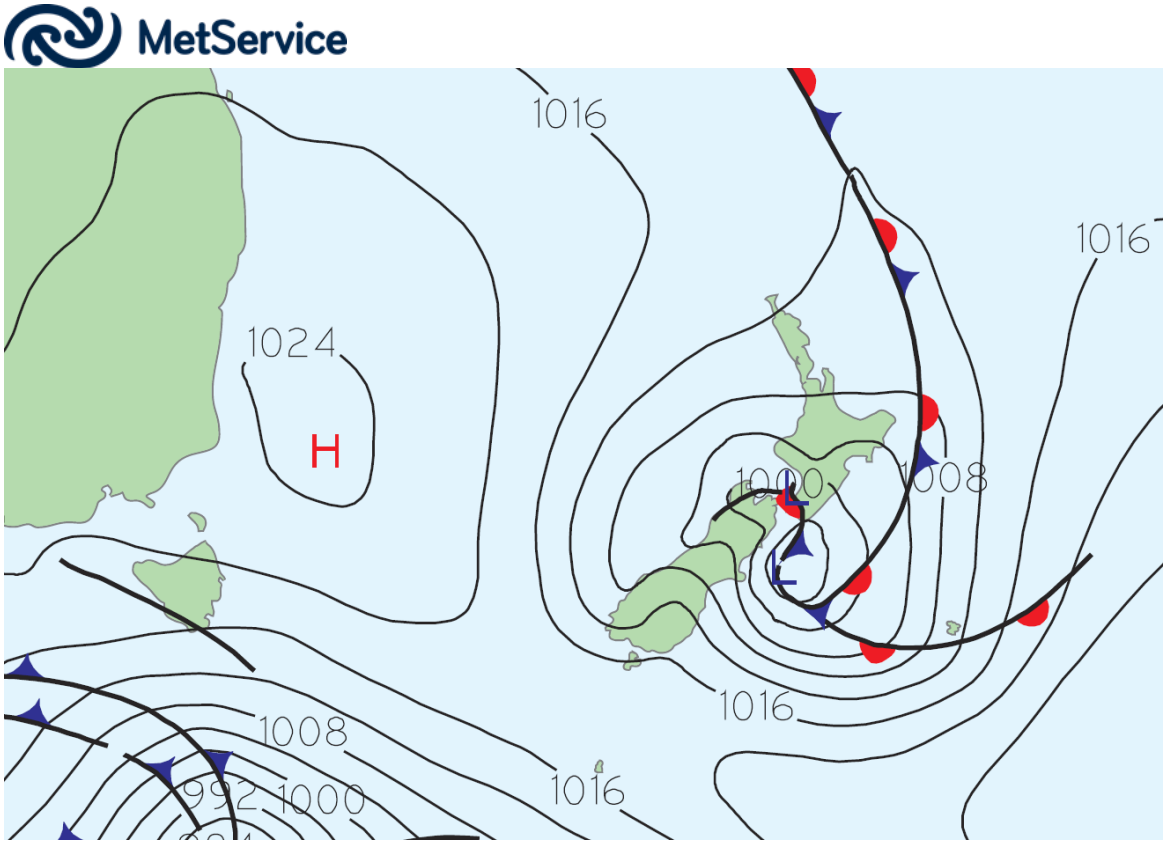


Figure 25 6 April 2017 0000NZST.



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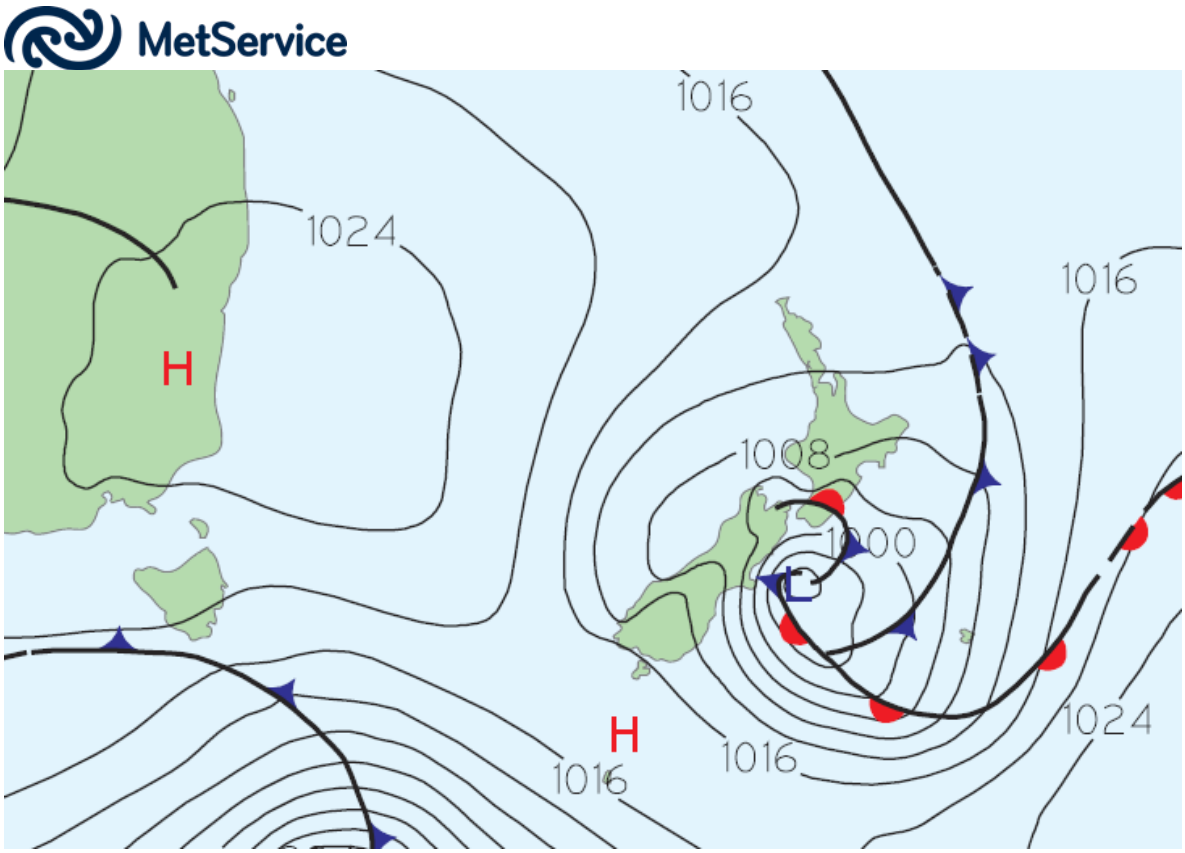

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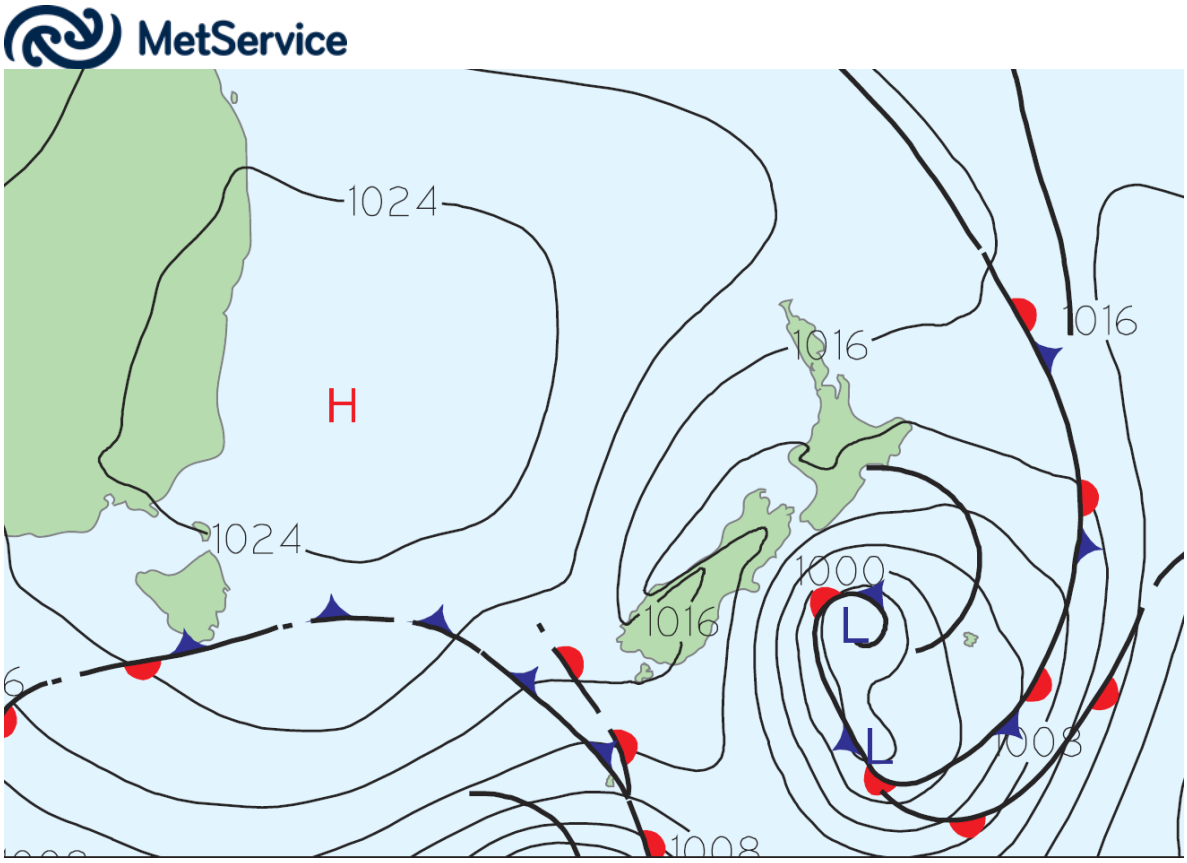

Figure 28 7 April 2017 0000 NZST.

Appendix 3: Synoptic Maps 13-14 April 2017 Cyclone Cook

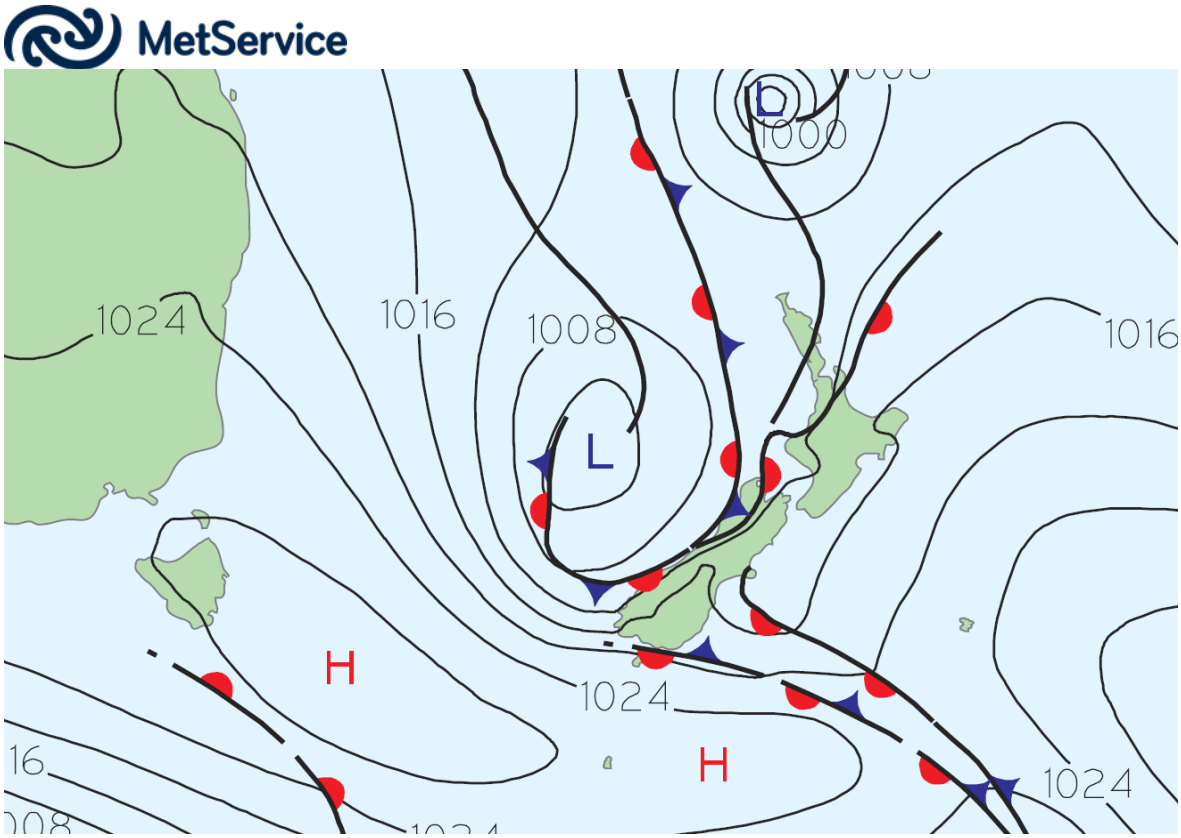

Figure 29 12 April 2017 at 1200 NZST.

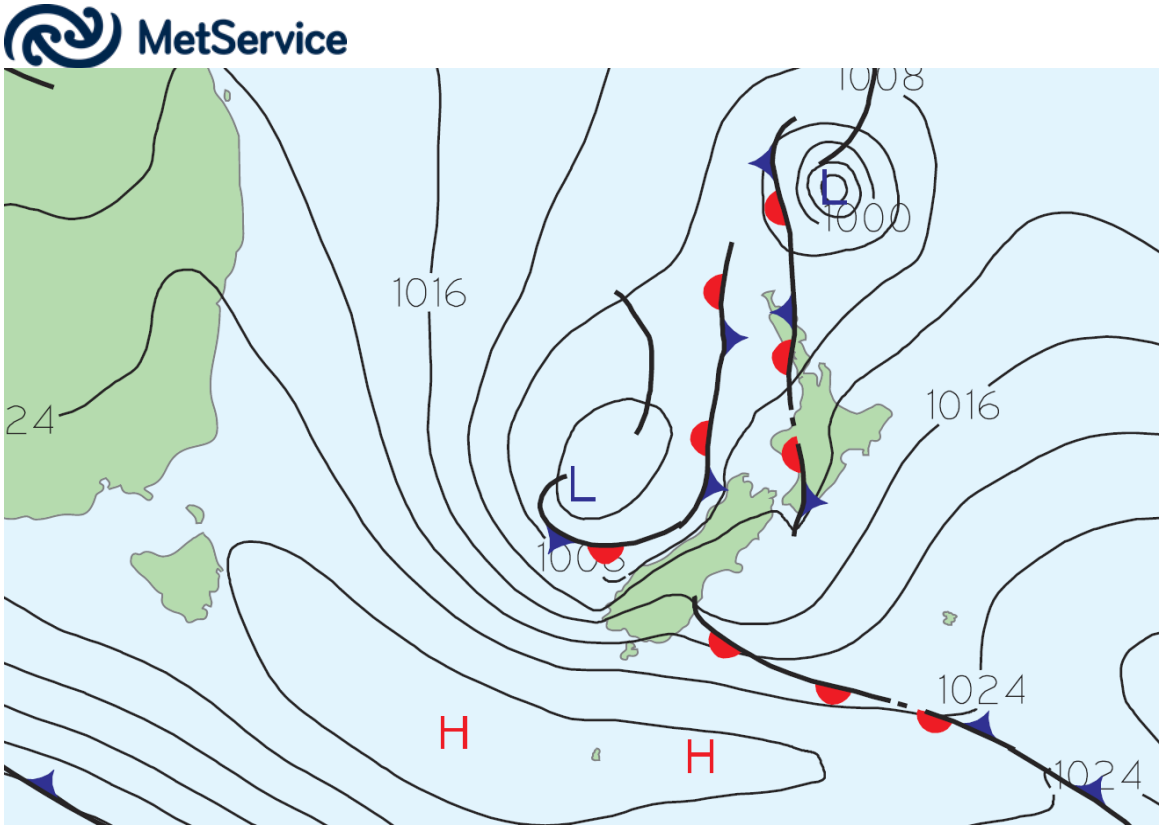

Figure 30 13 April 2017 at 0000 NZST.

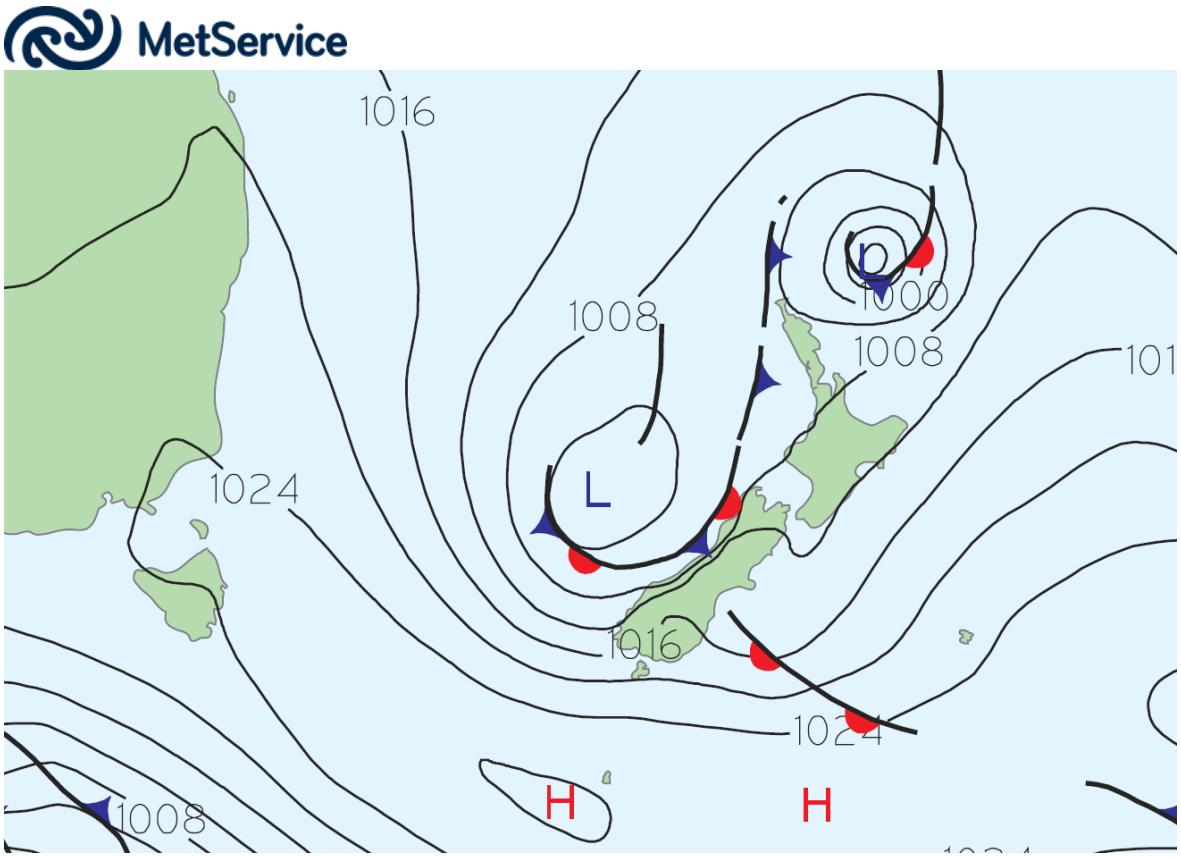

Figure 31 13 April 2017 at 0600 NZST.

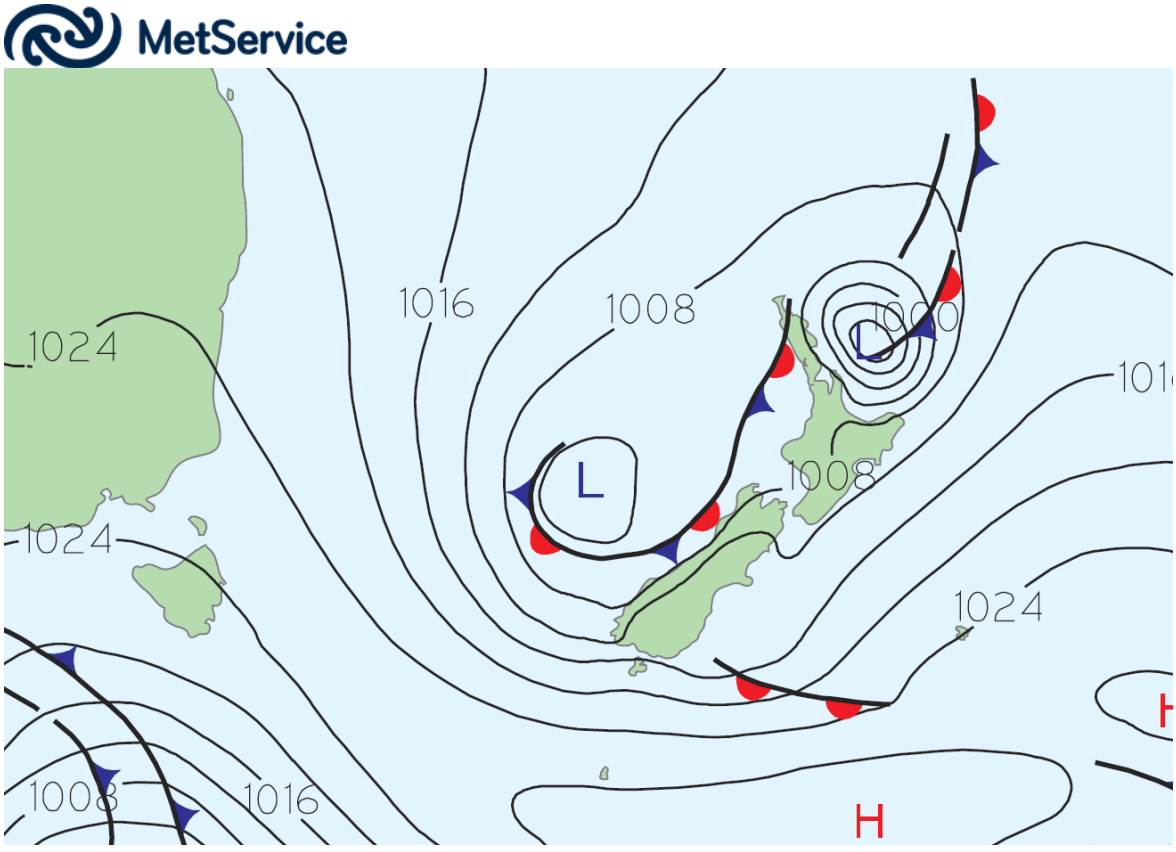

Figure 32 13 April 2017 at 1200 NZST.

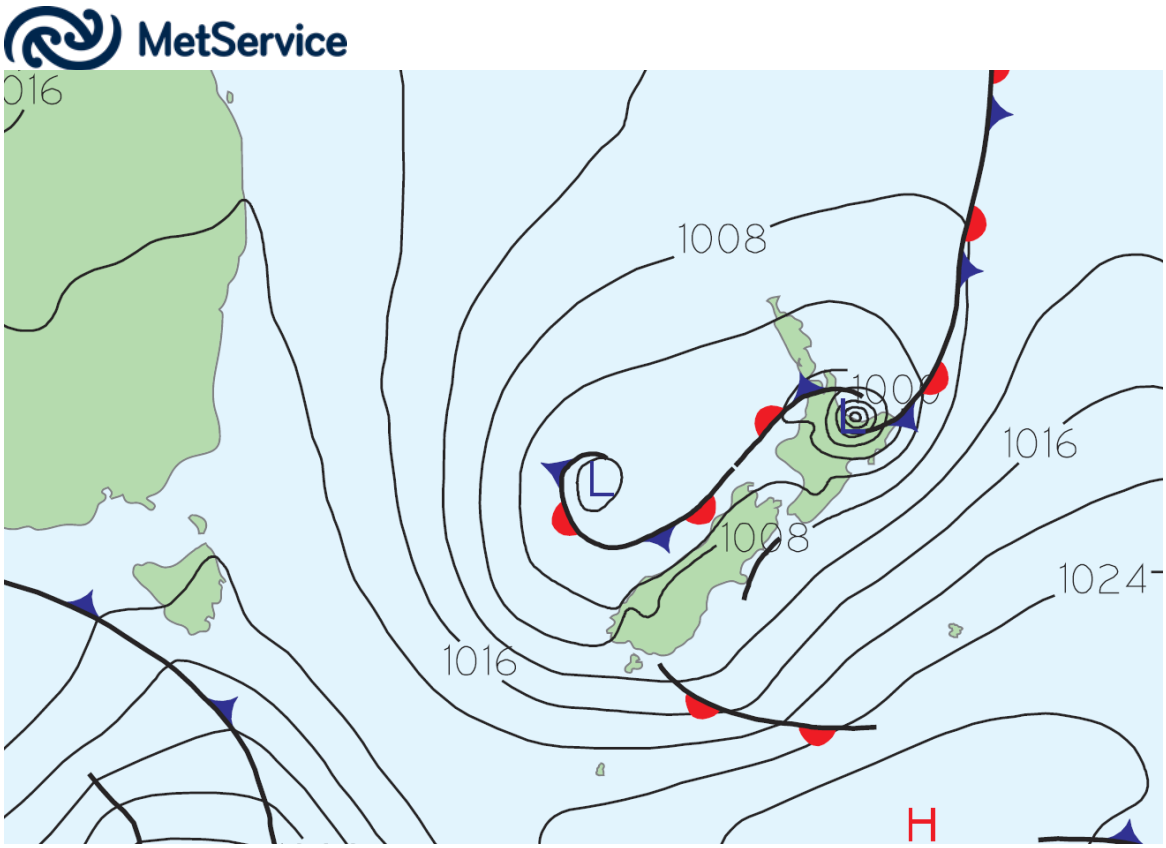

Figure 33 13 April 2017 at 1800 NZST.

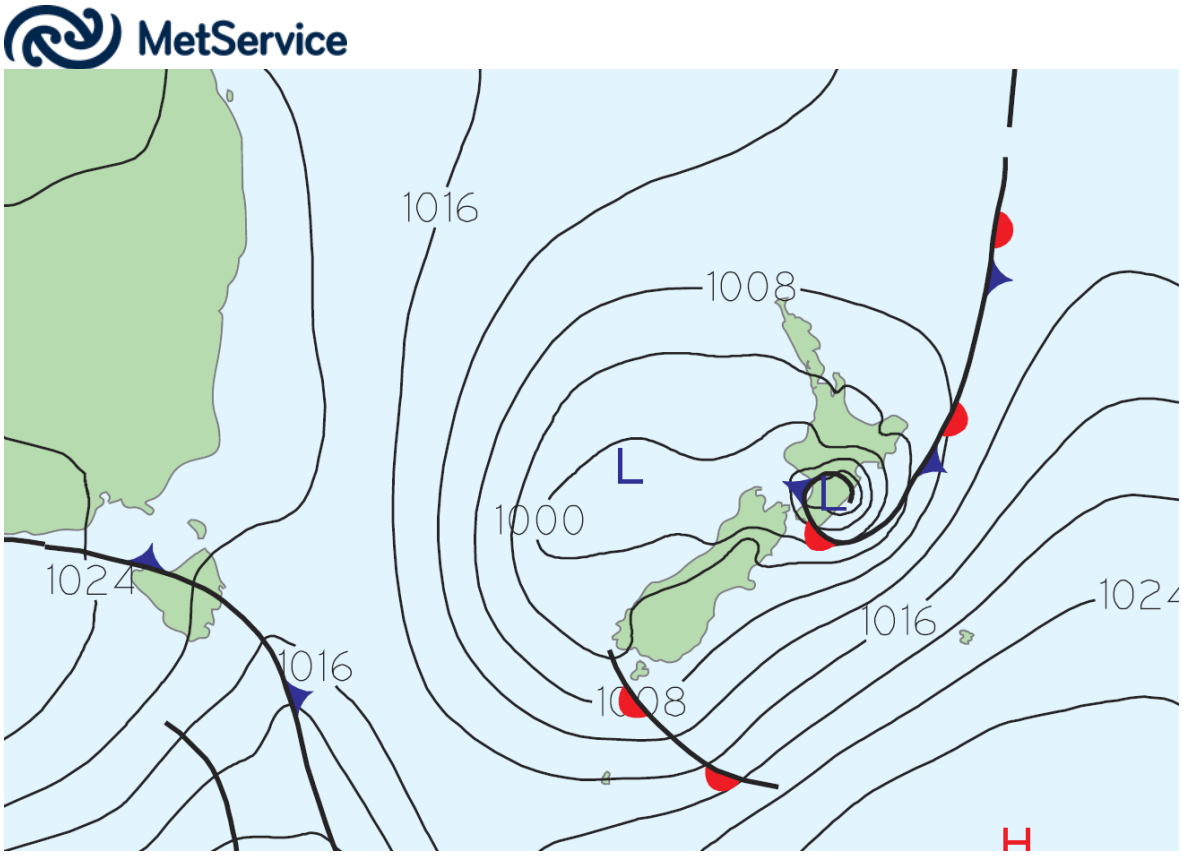

Figure 34 14 April 2017 at 0000 NZST.

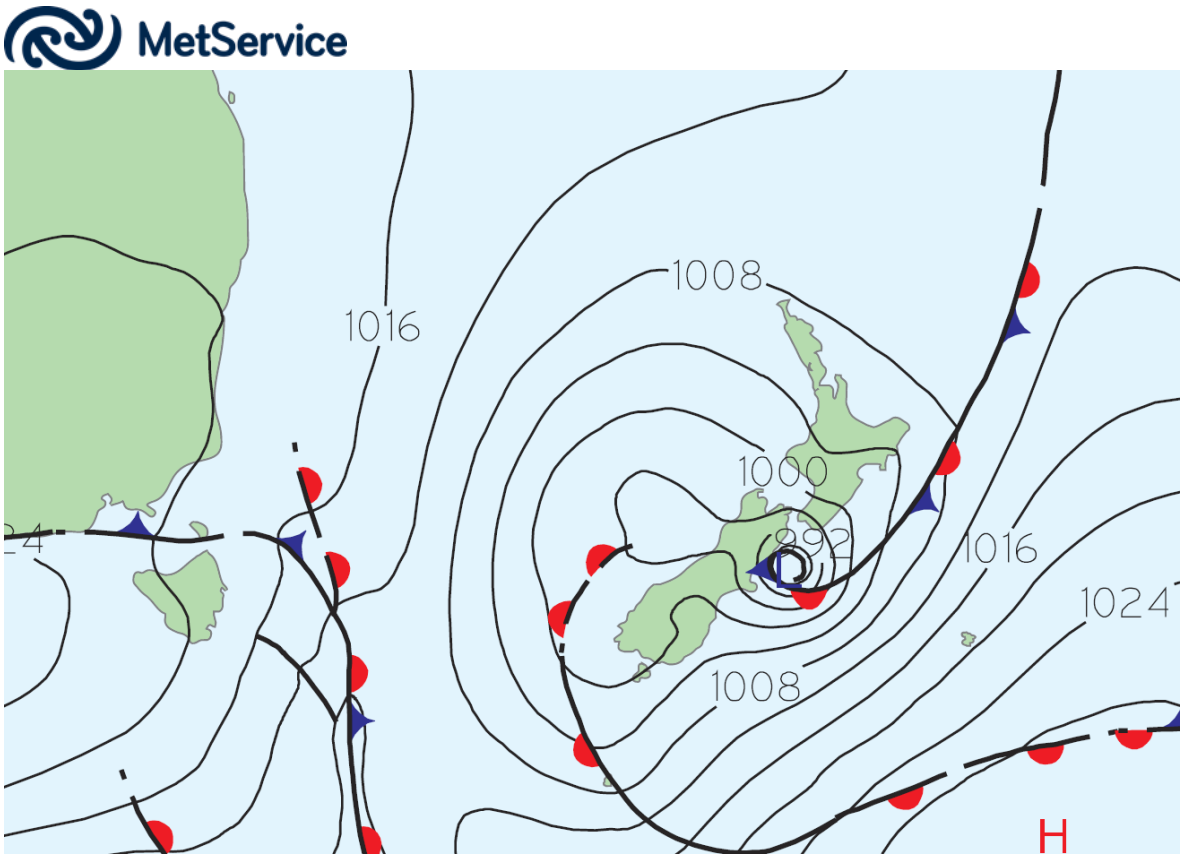

Figure 35 14 April 2017 at 0600 NZST.

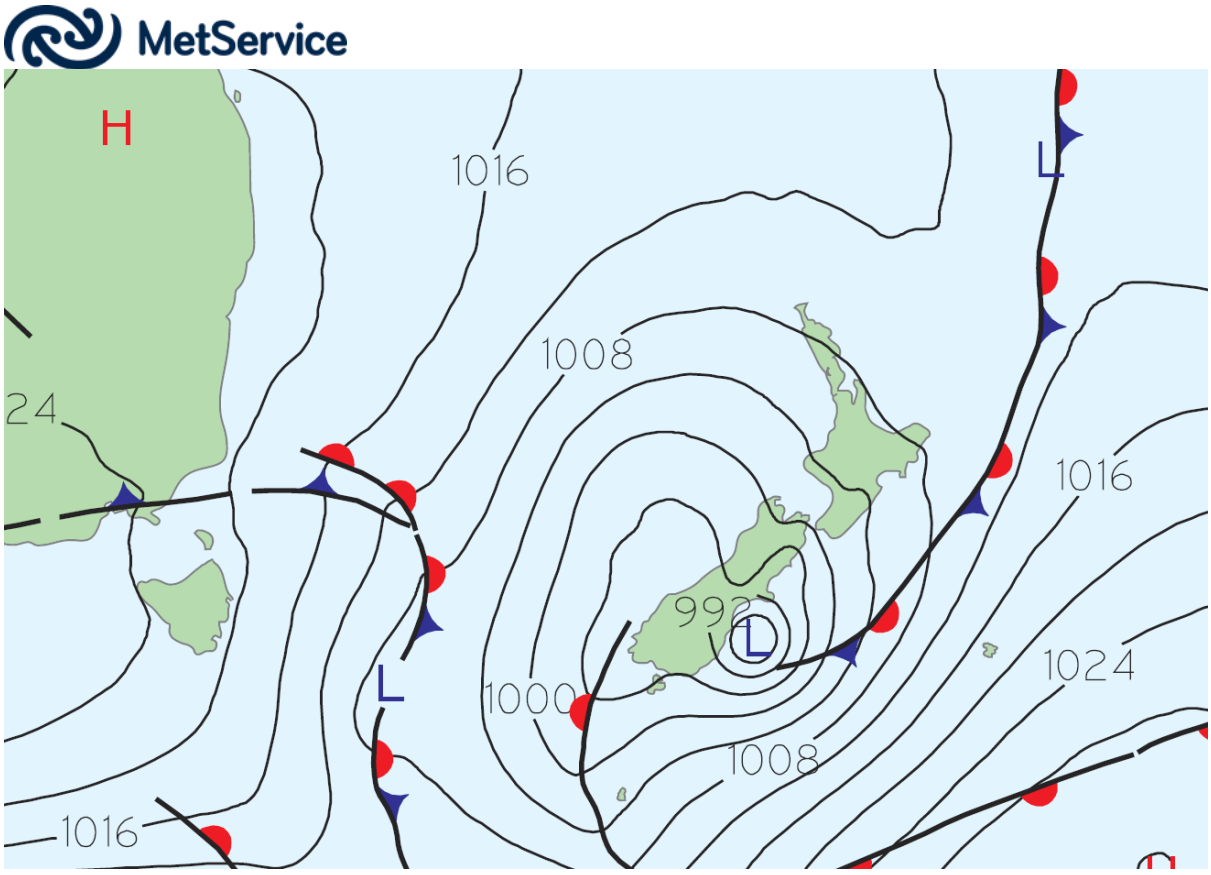

Figure 36 14 April 2017 at 1200 NZST.

Appendix 4: Meteorological Service Special Weather Bulletins

Below are issued MetService Special Weather Bulletins with filtered content that relate to the Bay of Plenty region. Included are the watches and warning preceding the event of 3-7 April as these assist with defining the antecedent conditions that were present.

Preceding Storm Event 3-7 April

SEVERE WEATHER WATCH 2044hrs 25-Mar-2017:

A slow-moving low in the Tasman Sea will direct a moist northeasterly flow over New Zealand during the weekend and on Monday. Rainbands embedded within the flow are likely to bring periods of heavy rain with possible thunderstorms to the northern half of the North Island, western Nelson, southern Westland and Fiordland during this time.
Additionally, a slow-moving east to southeasterly rainband is likely to bring a priod of persistent rain to the south of the South Island during Sunday and on Monday morning.

This Watch is for HEAVY RAIN possibly reaching warning criteria (e.g. 60-70mm in 9-12 hours, or 100mm in 24 hours) in the following areas...

COROMANDEL PENINSULA: From Sunday afternoon to Monday morning, periods of heavy rain with possible thunderstorms. Heaviest falls are likely overnight Sunday and Monday morning.

BAY OF PLENTY/ROTORUA: From Sunday afternoon to Monday afternoon, periods of heavy rain with possible thunderstorms. Heaviest falls are likely on Monday.

SEVERE WEATHER WATCH 0908hrs 26-Mar-2017:

A slow-moving low over the Tasman Sea will direct a moist northeasterly flow over New Zealand until late Monday. Rainbands embedded within the flow are likely to bring periods of heavy rain with possible thunderstorms to the northern half of the North Island, western Nelson, southern Westland and Fiordland during this time.

Additionally, a slow-moving east to southeasterly rainband is likely to bring a priod of persistent rain to the south of the South Island during today and Monday morning.

This Watch is for HEAVY RAIN possibly reaching warning criteria (e.g. 60-70mm in 9-12 hours, or 100mm in 24 hours) in the following areas...

COROMANDEL PENINSULA: From Sunday afternoon until about midday Monday, periods of heavy rain with possible thunderstorms. Heaviest falls are likely overnight Sunday and during Monday morning.

BAY OF PLENTY/ROTORUA: From Sunday afternoon to late Monday afternoon, periods of heavy rain with possible thunderstorms.
Heaviest falls are likely on Monday.

SEVERE WEATHER WATCH 1719hrs 26-Mar-2017

A slow-moving low over the Tasman Sea will direct a moist northeasterly flow over New Zealand until late Monday. Rainbands embedded within the flow are likely to bring periods of heavy rain with possible thunderstorms to the northern half of the North Island, western Nelson, southern Westland and Fiordland during this time.

This Watch is for HEAVY RAIN possibly reaching warning criteria (e.g. 60-70mm in 9-12 hours, or 100mm in 24 hours) in the following areas...

COROMANDEL PENINSULA: Until about midday Monday, periods of heavy rain with possible thunderstorms. Heaviest falls are likely overnight Sunday and during Monday morning.

BAY OF PLENTY/ROTORUA: Until late Monday afternoon, periods of heavy rain with possible thunderstorms. Heaviest falls are likely on Monday.

SEVERE WEATHER 2102hrs 26-Mar-2017

HEAVY RAIN OVER THE NORTHERN NORTH ISLAND, WESTERN NELSON AND SOUTHERN SOUTH ISLAND TONIGHT AND MONDAY

A slow-moving low over the Tasman Sea will direct a moist northeasterly flow over New Zealand until late Monday. Rainbands embedded within the flow are likely to bring periods of heavy rain to the northern half of the North Island, western Nelson, southern Westland and Fiordland during this time, with possible thunderstorms for the northern half of the North Island.

Additionally, a slow-moving east to southeasterly rainband is likely to bring a period of persistent rain to the southeast of the South Island tonight and Monday morning.

This Watch is for HEAVY RAIN possibly reaching warning criteria (e.g. 60-70mm in 9-12 hours, or 100mm in 24 hours) in the following areas...

COROMANDEL PENINSULA: Until about midday Monday, periods of heavy rain with possible thunderstorms. Heaviest falls are likely overnight Sunday and during Monday morning. Rainfall rates of 25mm per hour or more are possible in localised places.

BAY OF PLENTY/ROTORUA: Until late Monday afternoon, periods of heavy rain with possible thunderstorms. Heaviest falls are likely on Monday. Rainfall rates of 25mm per hour or more are possible in localised places.

SEVERE WEATHER WATCH 0902hrs 27-Mar-2017

HEAVY RAIN IN BAY OF PLENTY

A slow-moving low over the Tasman Sea is weakening, but it continues to direct a very moist northeasterly airstream onto the country. Heavy and thundery falls have affected much of the upper North Island, and also Fiordland and Westland, but the rain is gradually easing.

This Watch is for the likelihood of HEAVY RAIN meeting warning criteria (e.g. 50mm in 6 hours) in...

BAY OF PLENTY/ROTORUA: Until late Monday afternoon, periods of heavy rain with possible thunderstorms. Rainfall rates of 25mm per hour, or more.

SEVERE WEATHER WATCH 2005hrs 27-Mar-2017

HEAVY RAIN IN BAY OF PLENTY HAS EASED, BUT HEAVY RAIN FOR GISBORNE TUESDAY NIGHT.

A slow-moving low over the Tasman Sea continues to direct a very moist northeasterly airstream onto the country. Another low is forecast to approach Gisborne from the north late Tuesday and may bring heavy rain into the region Tuesday night.

This Watch is for the likelihood of HEAVY RAIN meeting short duration warning criteria (e.g. 50mm in 6 hours) in GISBORNE from Tuesday night until early morning Wednesday.

The risk of widespread heavy rain has passed in BAY OF PLENTY and the Watch for this region is now lifted. However, further heavy showers and thunderstorms are possible in Bay of Plenty during Tuesday afternoon and evening.

SEVERE WEATHER WATCH 1952hrs 28-Mar-2017

BURST OF HEAVY RAIN POSSIBLE FOR AUCKLAND, COROMANDEL PENINSULA,BAY OF PLENTY, ROTORUA, GISBORNE, HAWKES BAY AND WAIRARAPA TUESDAY NIGHT AND WEDNESDAY.

A complex area of low pressure northeast of the North Island is moving southwestwards, bringing rain to parts of the North Island stretching from Auckland to East Cape and Wairarapa tonight and during Wednesday.

There is still some uncertainty as to the depth and track of the low, but it now looks possible that Auckland, Coromandel Peninsula and Bay of Plenty will see some heavy and possibly thundery falls, and these areas have been added to this Watch. In contrast, less rain looks likely to affect Wairarapa, but due to the uncertainty a Watch will be maintained for now.

This Watch is for the likelihood of HEAVY RAIN meeting warning criteria in the following areas...

AUCKLAND, especially the Hunua Range and southern parts, and COROMANDEL PENINSULA:
tonight till Wednesday afternoon.

BAY OF PLENTY and ROTORUA:
tonight and Wednesday morning.

SEVERE WEATHER WATCH 0911hrs 29-Mar-2017

BURST OF HEAVY RAIN POSSIBLE FOR AUCKLAND, COROMANDEL PENINSULA,BAY OF PLENTY, ROTORUA, WAIKATO TODAY.

A low over Bay of Plenty and Waikato is forecast to weaken and move southwards, bringing rain to parts of the North Island.

Auckland, Coromandel Peninsula, Waikato and Bay of Plenty will see some heavy and possibly thundery falls. In contrast, further heavy rain looks less likely to affect Gisborne, Hawkes Bay and Wairarapa, and the Watch for those areas is now lifted.

This Watch is for the likelihood of HEAVY RAIN meeting warning criteria in the following areas...

AUCKLAND and COROMANDEL PENINSULA:

Although rain may ease for a time this morning, further localised heavy falls are possible, especially with any thunderstorms that form this afternoon. Rain should ease this evening.

WAIKATO, BAY OF PLENTY and ROTORUA:
Localised heavy rain is possible, especially with any thunderstorms that form this afternoon. Rain should ease this evening.

SEVERE WEATHER WATCH 1957hrs 29-Mar-2017

BURST OF HEAVY RAIN FOR BAY OF PLENTY and ROTORUA EASING BEFORE DAWN THURSDAY

A low over Waitomo this evening (Wednesday) is forecast to move southeastwards overnight and weaken. This system should continue to bring rain to parts of the North Island until Thursday morning, especially in the northeast of the Island.

This Watch is for the likelihood of HEAVY RAIN reaching short duration warning criteria (eg. 50mm in 6 hours or 60mm in 9 hours) in the following areas...

BAY OF PLENTY and ROTORUA
Rain with localised heavy falls easing from the west overnight Wednesday to Thursday.

Note, heavy rain has eased in Auckland, Waikato and Coromandel Peninsula, and the Watch for those areas is now lifted.

SEVERE WEATHER WATCH 1957hrs 29-Mar-2017

BURST OF HEAVY RAIN FOR BAY OF PLENTY and ROTORUA EASING BEFORE DAWN THURSDAY

A low over Waitomo this evening (Wednesday) is forecast to move south-eastwards overnight and weaken. This system should continue to bring rain to parts of the North Island until Thursday morning, especially in the northeast of the Island.

This Watch is for the likelihood of HEAVY RAIN reaching short duration warning criteria (eg. 50mm in 6 hours or 60mm in 9 hours) in the following areas...

BAY OF PLENTY and ROTORUA
Rain with localised heavy falls easing from the west overnight Wednesday to Thursday.

SEVERE WEATHER WATCH FOR 0708hrs 30-Mar-2017

RAIN HAS EASED OVER BAY OF PLENTY WATCH NOW LIFTED

Storm Event 3-7 April

SEVERE WEATHER WATCH 0953hrs 03-Apr-2017

A deepening low pressure system over the Tasman Sea approaches northern New Zealand on Tuesday, then crosses the country during Wednesday and Thursday, followed by a ridge of high pressure on Friday. This deep low should bring heavy rain to many parts of the country, especially from central North Island to the top of the South Island from Tuesday to Thursday, with strong winds at times. A heavy rain Warning is now in force for Taranaki, Wanganui and the Tararua Range.

This Watch is for the likelihood of HEAVY RAIN reaching warning criteria in the following areas...

COROMANDEL PENINSULA, BAY OF PLENTY and ROTORUA:
From Tuesday morning to Wednesday night.

SEVERE WEATHER WATCH 1359hrs 03-Apr-2017

HEAVY RAIN FROM CENTRAL NORTH ISLAND TO TOP OF THE SOUTH ISLAND, STRONG WINDS FOR TARANAKI WANGANUI AND BULLER

A deepening low pressure system over the Tasman Sea approaches northern New Zealand on Tuesday, then crosses the country during Wednesday and Thursday, followed by a ridge of high pressure on Friday. This deep low should bring heavy rain to many parts of the country, especially from central North Island to the top of the South Island from Tuesday to Thursday, with strong winds at times. A heavy rain Warning is now in force for Taranaki, Wanganui and the Tararua Range.

This Watch is for the likelihood of HEAVY RAIN reaching warning criteria in the following areas...

COROMANDEL PENINSULA, BAY OF PLENTY and ROTORUA:
From Tuesday morning to Wednesday night.

SEVERE WEATHER WATCH 1618hrs 03-Apr-2017

HEAVY RAIN FROM CENTRAL NORTH ISLAND TO UPPER SOUTH ISLAND, STRONG WINDS FOR TARANAKI, WHANGANUI, HOROWHENUA, KAPITI COAST AND BULLER

A deep low over the Tasman Sea is moving southeast towards the country. The low directs a moist northerly flow onto the North Island.

A slow moving trough is expected to lie over the central North Island.

Heavy rain is likely, especially in the vicinity of the trough. Gale southeasterlies may affect some areas south of the trough.

A heavy rain Warning is now in force for Taranaki, the Whanganui district, the Tararua Range, Hawkes Bay and Wairarapa.

This Watch is for the likelihood of HEAVY RAIN reaching warning criteria in the following areas...

COROMANDEL PENINSULA, BAY OF PLENTY and ROTORUA:
From Tuesday morning to Wednesday night.

SEVERE WEATHER WATCH 2037hrs 03-Apr-2017

HEAVY RAIN FROM CENTRAL NORTH ISLAND TO UPPER SOUTH ISLAND, STRONG WINDS FOR TARANAKI, WHANGANUI, HOROWHENUA, KAPITI COAST AND BULLER

A deep low over the Tasman Sea is moving southeast towards the country. The low directs a moist northerly flow onto the North Island.
A slow moving trough is expected to lie over the central North Island.
Heavy rain is likely, especially in the vicinity of the trough. Gale southeasterlies may affect some areas south of the trough.

A heavy rain Warning is now in force for Taranaki, the Whanganui district, the Tararua Range, Hawkes Bay and Wairarapa.

This Watch is for the likelihood of HEAVY RAIN reaching warning criteria in the following areas...

COROMANDEL PENINSULA, BAY OF PLENTY and ROTORUA:
From Tuesday morning to overnight Wednesday.

SEVERE WEATHER WARNING 9:46am 04-Apr-2017

HEAVY RAIN FOR MANY PARTS OF THE NORTH ISLAND AND STRONG WINDS ACROSS CENTRAL NEW ZEALAND A deepening low over the Tasman Sea is moving southeast towards the country. The low directs a moist northerly flow onto the North Island and a slow moving trough is expected to lie over the central North Island. The low is forecast to cross central New Zealand early Thursday, and both the low and trough move away to the east and southeast. Heavy rain is already falling in many places, especially in the vicinity of the trough, and is expected to continue until the passage of the low and trough early Thursday morning. Regions from Northland to Taranaki, including Coromandel Peninsula, Bay of Plenty, the central plateau, Gisborne, Hawkes Bay and Wairarapa are expected to receive the largest rain accumulations. Totals could exceed 200mm in some areas. There is also potential for thunderstorms bringing downpours and hourly rainfall rates of 25 to 35mm or possibly more.
This is a significant amount of rain and people are advised to watch out for rapidly rising rivers and streams, flooding and slips.
In addition, strong southeasterly winds are forecast about central New Zealand. Horowhenua Kapiti Coast, Nelson and Buller are expected to have the strongest winds, where gusts could reach 120 km/h for a time on Tuesday. Winds of this strength could cause damage to trees, powerlines and unsecured structures and make driving hazardous.

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HEAVY RAIN WARNING
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AREA/S AFFECTED: COROMANDEL PENINSULA
FORECAST:
Rain is forecast to become heavy this afternoon and to continue until midnight Wednesday. In the 33 hours from 3pm today until midnight Wednesday, 200 to 300mm may accumulate on the ranges, with lesser amounts 100 to 150mm possible elsewhere. Peak intensities of 25 to 45mm per hour and thunderstorms possible.

AREA/S AFFECTED: BAY OF PLENTY
FORECAST:

Heavy rain is expected to continue until Thursday morning. In the 45 hours from 9am today until 6am Thursday, 200 to 350mm of rain may accumulate. Peak intensities of 25 to 45mm and thunderstorms possible.

SEVERE WEATHER WARNING 11:44am 04-Apr-2017

HEAVY RAIN FOR MANY PARTS OF THE NORTH ISLAND AND THE UPPER SOUTH ISLAND, AND STRONG WINDS ACROSS CENTRAL NEW ZEALAND This is an update to the Warning to include Taumarunui, Taupo, Taihape and the Kaikoura Coast for heavy rain.
A deepening low over the Tasman Sea is moving southeast towards the country. The low directs a moist northerly flow onto the North Island and a slow moving trough is expected to lie over the central North Island. The low is forecast to cross central New Zealand early Thursday morning, and then both the low and trough move away to the east and southeast. Heavy rain is already falling in many places, especially in the vicinity of the trough, and is expected to continue until the passage of the low and trough early Thursday morning. The heaviest rain is expected from Northland to Whanganui, including Coromandel Peninsula, Bay of Plenty, the central plateau, Gisborne, Hawkes Bay,Wairarapa and the Kaikoura Coast. Rainfall totals could exceed 200mm in some areas. There is also potential for thunderstorms and downpours with hourly rainfall rates of 25 to 35mm or possibly more.
This is a significant amount of rain and people are advised to watch out for rapidly rising rivers and streams, flooding and slips.
In addition, strong southeasterly winds are forecast about central New Zealand. Horowhenua Kapiti Coast, Nelson and Buller are expected to have the strongest winds, where gusts could reach 120 km/h for a time on Wednesday. Winds of this strength could cause damage to trees, powerlines and unsecured structures and make driving hazardous.

==========
HEAVY RAIN WARNING
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AREA/S AFFECTED: COROMANDEL PENINSULA
FORECAST:
Rain is forecast to become heavy this afternoon and to continue until midnight Wednesday. In the 33 hours from 3pm today until midnight Wednesday, 200 to 300mm may accumulate on the ranges, with lesser amounts of 100 to 150mm possible elsewhere. Peak intensities of 25 to 45mm per hour and thunderstorms possible.

AREA/S AFFECTED: BAY OF PLENTY
FORECAST:
Heavy rain is expected to continue until Thursday morning. In the 43 hours from 11am today until 6am Thursday, 200 to 350mm of rain may accumulate. Peak intensities of 25 to 45mm and thunderstorms possible.

SEVERE WEATHER WARNING.11:44am 04-Apr-2017

HEAVY RAIN FOR MANY PARTS OF THE NORTH ISLAND AND THE UPPER SOUTH ISLAND, AND STRONG WINDS ACROSS CENTRAL NEW ZEALAND This is an update to the Warning to include Taumarunui, Taupo, Taihape and the Kaikoura Coast for heavy rain.
A deepening low over the Tasman Sea is moving southeast towards the country. The low directs a moist northerly flow onto the North Island and a slow moving trough is expected to lie over the central North Island. The low is forecast to cross central New Zealand early Thursday morning, and then both the low and trough move away to the east and southeast. Heavy rain is already falling in many places, especially in the vicinity of the trough, and is expected to continue until the passage of the low and trough early Thursday morning. The heaviest rain is expected from Northland to Whanganui, including Coromandel Peninsula, Bay of Plenty, the

central plateau, Gisborne, Hawkes Bay,Wairarapa and the Kaikoura Coast. Rainfall totals could exceed 200mm in some areas. There is also potential for thunderstorms and downpours with hourly rainfall rates of 25 to 35mm or possibly more.
This is a significant amount of rain and people are advised to watch out for rapidly rising rivers and streams, flooding and slips.
In addition, strong southeasterly winds are forecast about central New Zealand. Horowhenua Kapiti Coast, Nelson and Buller are expected to have the strongest winds, where gusts could reach 120 km/h for a time on Wednesday. Winds of this strength could cause damage to trees, powerlines and unsecured structures and make driving hazardous.

==========
HEAVY RAIN WARNING
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AREA/S AFFECTED: COROMANDEL PENINSULA
FORECAST:
Rain is forecast to become heavy this afternoon and to continue until midnight Wednesday. In the 33 hours from 3pm today until midnight Wednesday, 200 to 300mm may accumulate on the ranges, with lesser amounts of 100 to 150mm possible elsewhere. Peak intensities of 25 to 45mm per hour and thunderstorms possible.

AREA/S AFFECTED: BAY OF PLENTY
FORECAST:
Heavy rain is expected to continue until Thursday morning. In the 43 hours from 11am today until 6am Thursday, 200 to 350mm of rain may accumulate. Peak intensities of 25 to 45mm and thunderstorms possible.

SEVERE WEATHER WARNING 8:20pm 04-Apr-2017

HEAVY RAIN FOR MANY PARTS OF THE NORTH ISLAND AND THE UPPER SOUTH ISLAND, AND STRONG WINDS ACROSS CENTRAL NEW ZEALAND A deepening low over the Tasman Sea is forecast to cross central New Zealand overnight Wednesday and early Thursday morning and move away to the southeast later Thursday. Heavy rain has already fallen in many places and is expected to continue until the passage of the low early Thursday morning. The heaviest rain is expected from Northland to Whanganui, including Coromandel Peninsula, Bay of Plenty, the Central North Island High Country, Gisborne, Hawkes Bay,Wairarapa and the Kaikoura Coast. Rainfall totals could exceed 250mm in some areas.
There is also potential for thunderstorms and downpours with hourly rainfall rates of 25 to 45mm.
This is a significant amount of rain and people are advised to watch out for rapidly rising rivers and streams, flooding and slips.
In addition, strong southeasterly winds are forecast about central New Zealand. Horowhenua Kapiti Coast, Nelson and Buller are expected to have the strongest winds, where gusts could reach 120 km/h in exposed places for a time during Wednesday. Winds of this strength could cause damage to trees, powerlines and unsecured structures and make driving hazardous.
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HEAVY RAIN WARNING
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AREA/S AFFECTED: COROMANDEL PENINSULA
FORECAST:
Rain with heavy is forecast to continue until midnight Wednesday. In the 28 hours from 8pm today until midnight Wednesday, 150 to 200mm may accumulate on the ranges, with lesser amounts of 100 to 150mm possible elsewhere. Peak intensities of 25 to 45mm per hour and thunderstorms possible.

AREA/S AFFECTED: BAY OF PLENTY AND ROTORUA
FORECAST:
Heavy rain is expected to continue until Thursday morning. For area west of Whakatāne, in the 30 hours from 8pm today to 2am Thursday, 150 to 220mm of rain may accumulate. Peak intensities of 25 to 45mm and thunderstorms possible. For the area from Whakatāne eastwards, in the 34 hours from 8pm today to 6am Thursday, 200 to 300mm of rain may accumulate, especially on the ranges. Peak intensities of 25 to 45mm and thunderstorms possible.

SEVERE WEATHER WARNING 10:01am 05-Apr-2017

HEAVY RAIN FOR MANY PARTS OF THE NORTH ISLAND AND THE UPPER SOUTH ISLAND, AND STRONG WINDS ACROSS CENTRAL NEW ZEALAND A deepening low over the Tasman Sea is forecast to cross central New Zealand overnight Wednesday and early Thursday morning and move away to the southeast later Thursday. Heavy rain has already fallen in many places and is expected to continue until the passage of the low early Thursday morning. The heaviest rain is expected from Northland to Whanganui, including Coromandel Peninsula, Bay of Plenty, the Central North Island High Country, Gisborne, Hawkes Bay,Wairarapa and the Kaikoura Coast. There is also potential for thunderstorms and downpours with hourly rainfall rates of 25 to 45mm.
People are advised to watch out for rapidly rising rivers and streams, flooding and slips.
In addition, strong southeasterly winds are forecast about central New Zealand. Horowhenua Kapiti Coast, Nelson and Buller are expected to have the strongest winds, where gusts could reach 120 km/h in exposed places for a time during Wednesday.
Also, southwest gales are expected over Banks Peninsula and the Kaikoura Coast from Thursday morning to Thursday night, with gusts of 140km/h in exposed places. Winds of this strength could cause damage to trees, powerlines and unsecured structures and make driving hazardous.

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HEAVY RAIN WARNING
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AREA/S AFFECTED: COROMANDEL PENINSULA
FORECAST:
Further periods of heavy rain are expected until tonight. In the 13 hours from 9am a further 60 to 100mm may accumulate on the ranges, with lesser amounts elsewhere. Peak intensities of 25 to 45mm per hour and thunderstorms are possible.

AREA/S AFFECTED: BAY OF PLENTY AND ROTORUA
FORECAST:
Heavy rain is expected to continue until Thursday morning. For area west of Whakatāne, in the 16 hours from 9am today to 1am Thursday, 80 to 100mm of rain may accumulate. Peak intensities of 25 to 45mm and thunderstorms possible.
For the area from Whakatāne eastwards, in the 21 hours from 9am today to 6am Thursday, 120 to 150mm of rain may accumulate, especially on the ranges. Peak intensities of 25 to 45mm and thunderstorms possible.

SEVERE WEATHER WARNING 8:25pm 05-Apr-2017

HEAVY RAIN FOR PARTS OF THE NORTH ISLAND EASING FROM THE WEST OVERNIGHT WEDNESDAY, BUT CONTINUING ABOUT THE KAIKOURA COAST AND BANKS PENINSULA WITH SOUTHWEST GALES.
A deep low is moving southeast across central New Zealand overnight tonight, and is expected to lie to the east of the Banks Peninsula on Thursday. It is followed by a ridge of high pressure on Friday. Heavy rain is expected to continue until the passage of the low in the early hours of Thursday morning, but continue about parts of Marlborough and Canterbury through to

Thursday night. The heaviest rain is expected in Bay of Plenty through to about dawn Thursday with the potential for thunderstorms and downpours producing hourly rainfall rates of 25 to 45mm. For the South Island, the heaviest rain is expected about the Kaikoura Coast and Banks Peninsula until Thursday night.
People are advised to watch out for rapidly rising rivers and streams, surface flooding and slips.
In addition, southwest gales are expected over Banks Peninsula and the Kaikoura Coast from Thursday morning to Thursday night, with gusts of 130 km/h in exposed places. Winds of this strength could cause damage to trees, powerlines and unsecured structures and make driving hazardous.

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HEAVY RAIN WARNING
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AREA/S AFFECTED: COROMANDEL PENINSULA
FORECAST:
Further bursts of heavy rain are expected until midnight Wednesday.
In the 4 hours from 8pm, a further 20 to 40mm may accumulate on top of what has already fallen, especially on the ranges. Peak intensities of 15 to 25mm per hour and thunderstorms are possible.

AREA/S AFFECTED: BAY OF PLENTY AND ROTORUA
FORECAST:
Heavy rain is expected to continue until early Thursday morning.
For area west of Whakatāne, in the 5 hours from 8pm today to 1am Thursday, a further 30 to 60mm of rain may accumulate. Peak intensities of 20 to 35mm per hour and thunderstorms possible.
For the area from Whakatāne eastwards, in the 10 hours from 8pm today to 6am Thursday, a further 70 to 120mm of rain may accumulate, especially on the ranges. Peak intensities of 25 to 45mm and thunderstorms possible.

SEVERE WEATHER WARNING.ISSUED BY MetService AT 8:22am

WIDESPREAD HEAVY RAIN FOR PARTS OF THE NORTH ISLAND HAS NOW EASED, BUT CONTINUES ABOUT THE BANKS PENINSULA AND KAIKOURA COAST WITH SOUTHWEST GALES.
A deep low lies east of the upper South Island and is expected to move slowly east-southeast during today, followed by a ridge of high pressure on Friday. Rain has eased over Coromandel Peninsula, Bay of Plenty, Taranaki and the Tararua Range and the warnings for these regions are now lifted.

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WARNINGS NO LONGER IN FORCE
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HEAVY RAIN WARNINGS HAVE BEEN LIFTED FOR: COROMANDEL PENINSULA HEAVY RAIN WARNINGS HAVE BEEN LIFTED FOR: BAY OF PLENTY AND ROTORUA

10- 13 April (Cyclone Cook)

SEVERE WEATHER WATCH 1006hrs 10-Apr-2017

HEAVY RAIN EXPECTED OVER WEST OF SOUTH ISLAND ON TUESDAY SPREADING TO TARANAKI AND BAY OF PLENTY ON WEDNESDAY

A low is expected to move southeast over the Tasman Sea on Tuesday and Wednesday. Its associated front should bring periods of heavy rain to the west of the South Island on Tuesday, spreading to Taranaki and Bay of Plenty on Wednesday.

This watch is for the possibility of heavy rain reaching warning levels over Westland, Buller and northwest Nelson during Tuesday and over Taranaki and Bay of Plenty on Wednesday. The heavy rain over Bay of Plenty is likely to continue into Thursday.

Further to this system, the remains of tropical cyclone Cook may pass close to or east of the North Island late in the week and MetService meteorologists will continue to moniter the development of this cyclone.

SEVERE WEATHER 1535hrs 10-Apr-2017

HEAVY RAIN EXPECTED OVER PARTS OF NORTHERN AND CENTRAL NEW ZEALAND

A low moves southeast over the Tasman Sea on Tuesday and Wednesday.
Its associated front should bring periods of heavy rain to the west of the South Island starting on Tuesday, then spreading to Taranaki and Bay of Plenty on Wednesday.

This watch is for the possibility of heavy rain reaching warning levels in the following areas...

BAY OF PLENTY:
During Wednesday and Thursday, and possibly continuing into Friday.

Further to this system, Cyclone Cook may pass close to, or east of, the North Island during Friday, and MetService Meteorologists will continue to monitor this cyclone closely.

SEVERE WEATHER WARNING. 9:47am 11-Apr-2017

HEAVY RAIN EXPECTED FOR MANY PARTS OF NEW ZEALAND.
A low moving southeast over the Tasman Sea is expected to become slow-moving later today. Its associated front is expected to bring periods of heavy rain to the north and west of the South Island and also Otago later today and early tomorrow then spread to the North Island later Wednesday. The rain over parts of the North Island is expected to continue into Thursday and possibly Friday. Rainfall accumulations could exceed 200mm over Bay of Plenty and Taupo over 48 hours from midday Wednesday, with lesser amounts in other areas.
Further, the remains of Tropical Cyclone Cook are likely to cross from about Bay of Plenty to Hawkes Bay Thursday night or Friday with further heavy rain, large swells and an area of damaging severe gales. The precise track of the low centre is uncertain at this stage and more details will be added in the following days.
==========
HEAVY RAIN WARNING
==========

AREA/S AFFECTED: BAY OF PLENTY TAUPO
FORECAST:
Periods of heavy rain are expected from about midday tomorrow to midday Friday. In the 48 hours from midday Wednesday 200 to 250mm is forecast to accumulate. Maximum rainfall rates 30 to 40mm with thunderstorms possible.

SEVERE WEATHER WARNING. 8:47pm 11-Apr-2017

HEAVY RAIN FOR MANY PARTS OF NEW ZEALAND A slow-moving low lies over the eastern Tasman Sea. Its associated front is expected to bring periods of heavy rain to the north and west of the South Island, also Otago, then spread to the North Island on Wednesday. The rain over parts of the North Island is expected to continue into Thursday or even Friday in some regions. Rainfall accumulations could exceed 200mm over Bay of Plenty and Taupo over 45 hours from late Wednesday morning, with lesser amounts in other areas.
Further, Cyclone Cook is expected to cross from about Bay of Plenty to Hawkes Bay Thursday night or Friday morning with further heavy rain, large swells and an area of damaging severe gales. The precise track of the low centre may change as the cyclone approaches, but it's likely that a number of regions in the North Island will be affected, and additional Warnings and Watches for both Heavy Rain and Severe Gales will probably be issued on Wednesday.
People should be aware that the heavy rain forecast will cause rivers and streams to rise rapidly, and may cause flooding and slips.
Driving conditions could also be hazardous, so people will need to take extra care on the roads, and even consider altering their Easter travel plans.
==========
HEAVY RAIN WARNING
==========

AREA/S AFFECTED: COROMANDEL PENINSULA, BAY OF PLENTY AND TAUPO
FORECAST:
Periods of heavy rain are expected from late Wednesday morning into Friday. In the 45 hours from 9am Wednesday to 6am Friday, 200 to 250mm is forecast to accumulate. Maximum rainfall rates 30 to 40mm with thunderstorms possible.

SEVERE WEATHER WARNING.9:08pm 11-Apr-2017

HEAVY RAIN FOR MANY PARTS OF NEW ZEALAND A slow-moving low lies over the eastern Tasman Sea. Its associated front is expected to bring periods of heavy rain to the north and west of the South Island, also Otago, then spread to the North Island on Wednesday. The rain over parts of the North Island is expected to continue into Thursday or even Friday in some regions. Rainfall accumulations could exceed 200mm over Bay of Plenty and Taupo over 45 hours from late Wednesday morning, with lesser amounts in other areas.
Further, Cyclone Cook is expected to cross from Coromandel Peninsula to Wellington during Thursday evening and Friday morning with further heavy rain, large swells and an area of damaging severe gales. The precise track of the low centre may change as the cyclone approaches, but it's likely that a number of regions in the North Island will be affected, and additional Warnings and Watches for both Heavy Rain and Severe Gales will probably be issued on Wednesday.
People should be aware that the heavy rain forecast will cause rivers and streams to rise rapidly, and may cause flooding and slips.
Driving conditions could also be hazardous, so people will need to take extra care on the roads, and even consider altering their Easter travel plans.
==========
HEAVY RAIN WARNING
==========

AREA/S AFFECTED: COROMANDEL PENINSULA, BAY OF PLENTY AND TAUPO
FORECAST:
Periods of heavy rain are expected from late Wednesday morning into Friday. In the 45 hours from 9am Wednesday to 6am Friday, 200 to 250mm is forecast to accumulate. Maximum rainfall rates 30 to 40mm with thunderstorms possible.

SEVERE WEATHER WARNING.9:08pm 11-Apr-2017

HEAVY RAIN FOR MANY PARTS OF NEW ZEALAND A slow-moving low lies over the eastern Tasman Sea. Its associated front is expected to bring periods of heavy rain to the north and west of the South Island, also Otago, then spread to the North Island on Wednesday. The rain over parts of the North Island is expected to continue into Thursday or even Friday in some regions. Rainfall accumulations could exceed 200mm over Bay of Plenty and Taupo over 45 hours from late Wednesday morning, with lesser amounts in other areas.
Further, Cyclone Cook is expected to cross from Coromandel Peninsula to Wellington during Thursday evening and Friday morning with further heavy rain, large swells and an area of damaging severe gales. The precise track of the low centre may change as the cyclone approaches, but it's likely that a number of regions in the North Island will be affected, and additional Warnings and Watches for both Heavy Rain and Severe Gales will probably be issued on Wednesday.
People should be aware that the heavy rain forecast will cause rivers and streams to rise rapidly, and may cause flooding and slips.
Driving conditions could also be hazardous, so people will need to take extra care on the roads, and even consider altering their Easter travel plans.
==========
HEAVY RAIN WARNING
==========
AREA/S AFFECTED: COROMANDEL PENINSULA, BAY OF PLENTY AND TAUPO
FORECAST:
Periods of heavy rain are expected from late Wednesday morning into Friday. In the 45 hours from 9am Wednesday to 6am Friday, 200 to 250mm is forecast to accumulate. Maximum rainfall rates 30 to 40mm with thunderstorms possible.

SEVERE WEATHER WARNING. 9:58am 12-Apr-2017

HEAVY RAIN FOR MANY PARTS OF NEW ZEALAND. CYCLONE COOK EXPECTED TO BRING SEVERE GALES TO PARTS OF THE NORTH ISLAND.
A low lies slow moving west of the South Island directing a moist and unsettled northeasterly airstream over New Zealand. Heavy rain is now falling over parts of the country and is expected to continue into Thursday or even Friday in some regions. Rainfall accumulations could exceed 200mm over Bay of Plenty and Taupo during this time, with lesser amounts in other areas.
Cyclone Cook is expected to make landfall somewhere over the Coromandel Peninsula or western Bay of Plenty late Thursday afternoon or evening and move southwards reaching Wellington in the early hours of Friday morning. On this track, damaging severe gales with gusts of
150 km/h or more are possible, affecting regions from Auckland to Coromandel Peninsula and Bay of Plenty, down through the central North Island and into Wellington. Eastern coastal areas of Auckland, Coromandel Peninsula and Bay of Plenty may see large waves of 5 metres or more, storm surges near the centre of Cyclone Cook, coastal inundation and erosion. The precise track of the Cyclone centre may change as the system approaches.
People should be aware that this is a very significant event and is likely to produce widespread flooding, slips and wind damage, including to powerlines and may even lift roofs. Driving conditions are likely to be hazardous, so people will need to take extra care on the roads, and even consider altering their Easter travel plans.
==========
HEAVY RAIN WARNING
==========
AREA/S AFFECTED: COROMANDEL PENINSULA, BAY OF PLENTY AND TAUPO
FORECAST:
Periods of heavy rain are expected from today (Wednesday) until Thursday night. In the 39 hours from 9am Wednesday to midnight Thursday, 150 to 250mm is forecast to accumulate. Maximum rainfall rates 30 to 40mm with thunderstorms possible.
==========
STRONG WIND WARNING

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AREA/S AFFECTED: COROMANDEL PENINSULA AND BAY OF PLENTY
FORECAST:
From Thursday afternoon until midnight Thursday, severe gales with gusts of 150 km/h or more are possible. Also, coastal areas in the east can expect large waves of 5 metres or more during this time, with storm surges near the centre of Cyclone Cook, and possible inundation and coastal erosion.

SEVERE WEATHER WARNING. 8:51pm 12-Apr-2017

HEAVY RAIN FOR MANY PARTS OF NEW ZEALAND. CYCLONE COOK EXPECTED TO BRING SEVERE GALES TO PARTS OF THE NORTH ISLAND.
A low lies slow moving west of the South Island directing a moist and unsettled northeasterly airstream over New Zealand. Heavy rain is now falling over parts of the country and is expected to continue into Thursday. Further rainfall accumulations could exceed 160mm over Bay of Plenty and Taupo during this time, with lesser amounts in other areas.
Cyclone Cook is expected to make landfall over the Coromandel Peninsula or western Bay of Plenty Thursday afternoon and move southwards reaching Wellington in the early hours of Friday morning.
On this track, damaging severe gales with gusts of 150 km/h or more are possible, affecting regions from Auckland to Coromandel Peninsula and Bay of Plenty, down to Wellington. Eastern coastal areas of Auckland, Coromandel Peninsula and Bay of Plenty may see large waves of 5 metres or more, storm surges near the centre of Cyclone Cook, coastal inundation and erosion. The precise track of the Cyclone centre may change as the system approaches.
People should be aware that this is a very significant event and is likely to produce widespread flooding, slips and wind damage, including to powerlines and may even lift roofs and bring down large trees. Driving conditions are likely to be hazardous, so people will need to take extra care on the roads, and even consider altering their Easter travel plans.
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HEAVY RAIN WARNING
==========
AREA/S AFFECTED: COROMANDEL PENINSULA, BAY OF PLENTY ROTORUA AND TAUPO
FORECAST:
Periods of heavy rain are expected from Wednesday evening until Thursday evening. In the 24 hours from 8pm Wednesday to 8pm Thursday,
120 to 160mm is forecast to accumulate, in addition to what has already fallen. Maximum rainfall rates 30 to 40mm with thunderstorms possible.
==========
STRONG WIND WARNING
==========
AREA/S AFFECTED: COROMANDEL PENINSULA AND BAY OF PLENTY
FORECAST:
From Thursday afternoon until Thursday evening, severe gales with gusts of 150 km/h or more are possible. Also, coastal areas in the east can expect large waves of 5 metres or more during this time, with storm surges near the centre of Cyclone Cook, and possible inundation and coastal erosion.

SEVERE WEATHER WARNING. 9:12am 13-Apr-2017

CYCLONE COOK EXPECTED TO BRING FURTHER HEAVY RAIN AND SEVERE GALES TO PARTS OF THE NORTH ISLAND.
Cyclone Cook is expected to make landfall over Bay of Plenty this evening and move southwards reaching Wellington or Wairarapa in the early hours of Friday morning. On this track, damaging severe gales with gusts of 150 km/h or more are possible, affecting regions from Auckland to Coromandel Peninsula and Bay of Plenty, down to Wellington. Coastal areas

of eastern Coromandel Peninsula and Bay of Plenty may see large waves of 5 metres or more, storm surges near the centre of Cyclone Cook, coastal inundation and erosion.
In addition, heavy rain is falling over parts of the country. Further rainfall accumulations could exceed 100mm in Bay of Plenty and Coromandel Peninsula, with lesser amounts in other areas, before Cyclone Cook moves away to the south this evening.
People should be aware that this is a very significant event and is likely to produce widespread flooding, slips and wind damage, including to powerlines and may even lift roofs and bring down large trees. Driving conditions are likely to be hazardous, so people will need to take extra care on the roads, and even consider altering their Easter travel plans.
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HEAVY RAIN WARNING
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AREA/S AFFECTED: COROMANDEL PENINSULA, BAY OF PLENTY AND ROTORUA
FORECAST:
Heavy rain is expected to ease tonight. In the 12 hours from 9am to 9pm today, 80 to 120mm is forecast to accumulate, in addition to what has already fallen. The heaviest falls are expected from around 3pm, when rainfall rates could reach 25 to 50mm or more with thunderstorms possible.
==========
STRONG WIND WARNING
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AREA/S AFFECTED: COROMANDEL PENINSULA AND BAY OF PLENTY
FORECAST:
From this afternoon until late this evening, severe gales with gusts of 150 km/h or more are possible. Also, coastal areas in the east can expect large waves of 5 metres or more during this time, with storm surges near the centre of Cyclone Cook, and possible inundation and coastal erosion.

High Water Advice 12:20pm 13-Apr-2017

Situation: Cyclone Cook is expected to lie about coastal Bay of Plenty early this evening, then move away to the south tonight.

Areas affected: Waikato Bay of Plenty

Forecast to midnight Friday

East to northeast winds are expected to rise to severe gale about the Coromandel Peninsula and Bay of Plenty this afternoon and early evening. Atmospheric pressure will reach a minimum over coastal Bay of Plenty early this evening, with an increase in sea level of 30 to 40cm expected. This is likely to coincide with high tide this evening. Wave run-up forced by severe gales is likely to peak east of the low centre. Wave run-up of 20 to 30cm is forecast about eastern parts of the Coromandel Peninsula, but run-up of 30 to 50cm is possible about the Bay of Plenty. Note, northeast swells should peak tonight and overnight at around 6 metres.

There is a moderate risk of a combined 40 to 60cm sea level rise above the current high tide mark this evening about coastlines exposed to the northeast from Fletcher Bay to north of Tauranga, and
a high risk of a combined 50 to 90cm sea level rise above the current high tide mark about coastlines exposed to the northeast from about Tauranga to Cape Runaway.

Note, waves should gradually ease Friday morning, although another smaller peak in sea level rise is possible around high tide 9am Friday morning.

SEVERE WEATHER WARNING. 4:20pm 13-Apr-2017

CYCLONE COOK EXPECTED TO BRING FURTHER HEAVY RAIN AND SEVERE GALES TO PARTS OF THE NORTH ISLAND.
The centre of Cyclone Cook lay about 100km east of Whitianga in the Coromandel Peninsula at 3pm Thursday and is expected to make landfall over Bay of Plenty between Tauranga and Whakatāne about 6pm this evening, then move southwards reaching Wellington or Wairarapa in the early hours of Friday morning. On this track, damaging severe gales with gusts of 150 km/h or more are possible, affecting regions from Coromandel Peninsula and Bay of Plenty, down to Wellington. Coastal areas of eastern Coromandel Peninsula and Bay of Plenty may see large waves of 5 metres or more, storm surges near the centre of Cyclone Cook, coastal inundation and erosion.
Heavy rain has eased over Northland and the warning there is now lifted. Heavy rain further south should gradually ease from the north over the next 12 hours. The centre of the low is now far enough east of Auckland that the risk of severe gales there has eased and the wind warning for Auckland is now lifted.
People should be aware that this is a very significant event and is likely to produce widespread flooding, slips and wind damage, including to powerlines and may even lift roofs and bring down large trees. Driving conditions are likely to be hazardous, so people will need to take extra care on the roads, and even consider altering their Easter travel plans.
==========
HEAVY RAIN WARNING
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AREA/S AFFECTED: AUCKLAND, INCLUDING GREAT BARRIER ISLAND
FORECAST:
Further heavy rain is expected today, especially in the east of the region. In the 2 hours from 4pm to 6pm today, 20 to 40mm of rain may accumulate, in addition to what has already fallen.
AREA/S AFFECTED: COROMANDEL PENINSULA, BAY OF PLENTY AND ROTORUA
FORECAST:
Heavy rain is expected to ease tonight. In the 4 hours from 4m to 8pm today, 30 to 50mm is forecast to accumulate, in addition to what has already fallen.
==========
STRONG WIND WARNING
==========
AREA/S AFFECTED: COROMANDEL PENINSULA AND BAY OF PLENTY
FORECAST:
From this afternoon until late this evening, severe gales with gusts of 150 km/h or more are possible. Also, coastal areas in the east can expect large waves of 5 metres or more during this time, with storm surges near the centre of Cyclone Cook, and possible inundation and coastal erosion.

SEVERE WEATHER WARNING. 9:03pm

CYCLONE COOK EXPECTED TO BRING FURTHER HEAVY RAIN AND SEVERE GALES TO PARTS OF NEW ZEALAND.
The centre of Cyclone Cook lay close to Rotorua at 8pm Thursday and is expected to move southwards reaching Wairarapa in the early hours of Friday morning. On this track, damaging severe gales with gusts of
140 km/h or more are possible, affecting regions from Gisborne down to Wellington.
Heavy rain has eased over Auckland, Great Barrier Island, Coromandel Peninsula and Bay of Plenty and the warnings there are now lifted.
Heavy rain further south should gradually ease from the north over the next 12 hours. The centre of the low is now far enough east of Auckland that the risk of severe gales there has eased and the wind warning for Auckland is now lifted.
People should be aware that this is a very significant event and is likely to produce widespread flooding, slips and wind damage, including to powerlines and may even lift roofs and bring down large trees. Driving conditions are likely to be hazardous, so people will need to take extra care on the roads, and even consider altering their Easter travel plans.

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WARNINGS NO LONGER IN FORCE
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HEAVY RAIN WARNINGS HAVE BEEN LIFTED FOR: COROMANDEL PENINSULA, BAY OF PLENTY AND ROTORUA.

STRONG WIND WARNINGS HAVE BEEN LIFTED FOR: COROMANDEL PENINSULA AND BAY OF PLENTY.

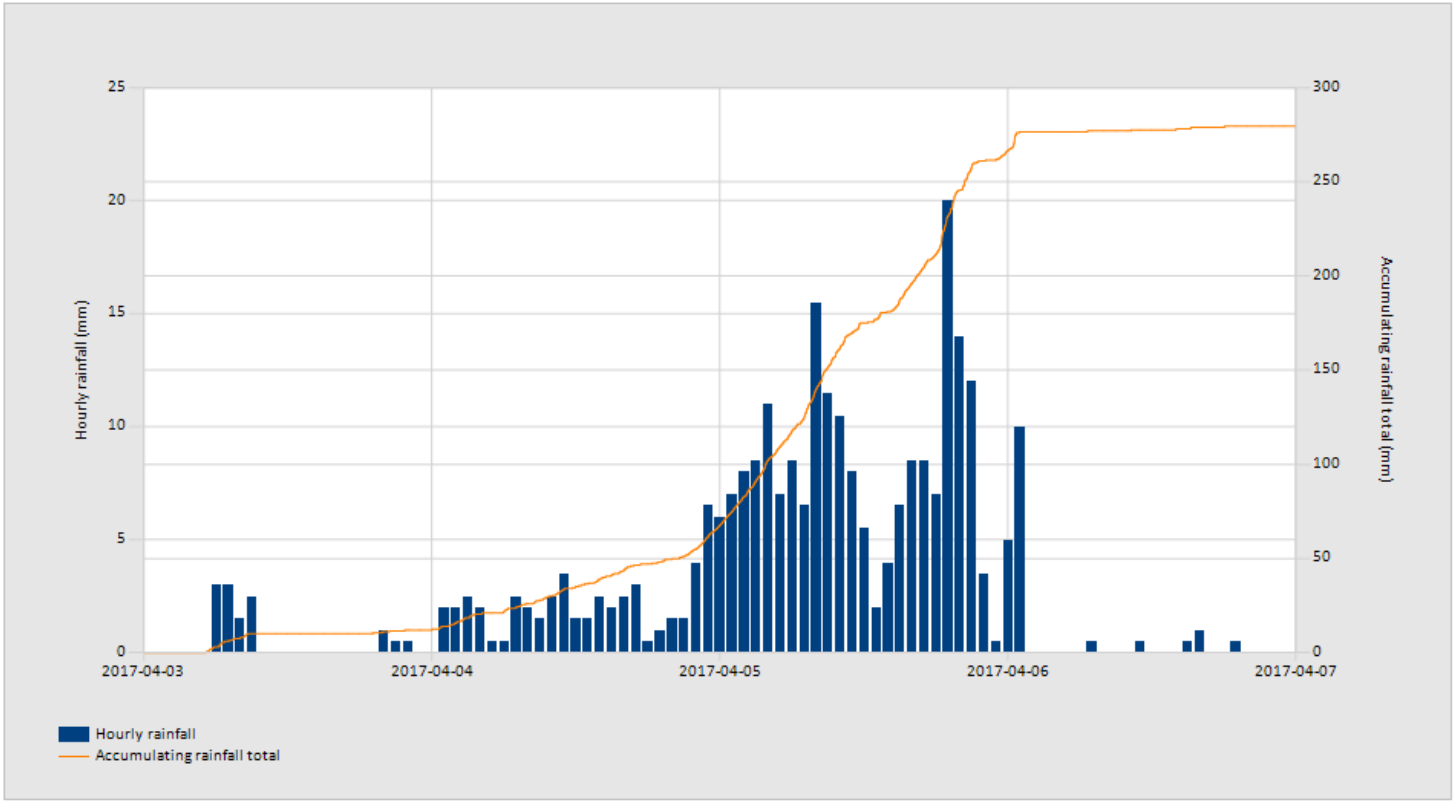
Appendix 5: Whakatāne Catchment Rainfall Hyetographs

BAY OF PLENTY REGIONAL COUNCIL TOI MOANA

Whakatane at Huiarau Summit

Apr 27, 2017 | 1 of 1

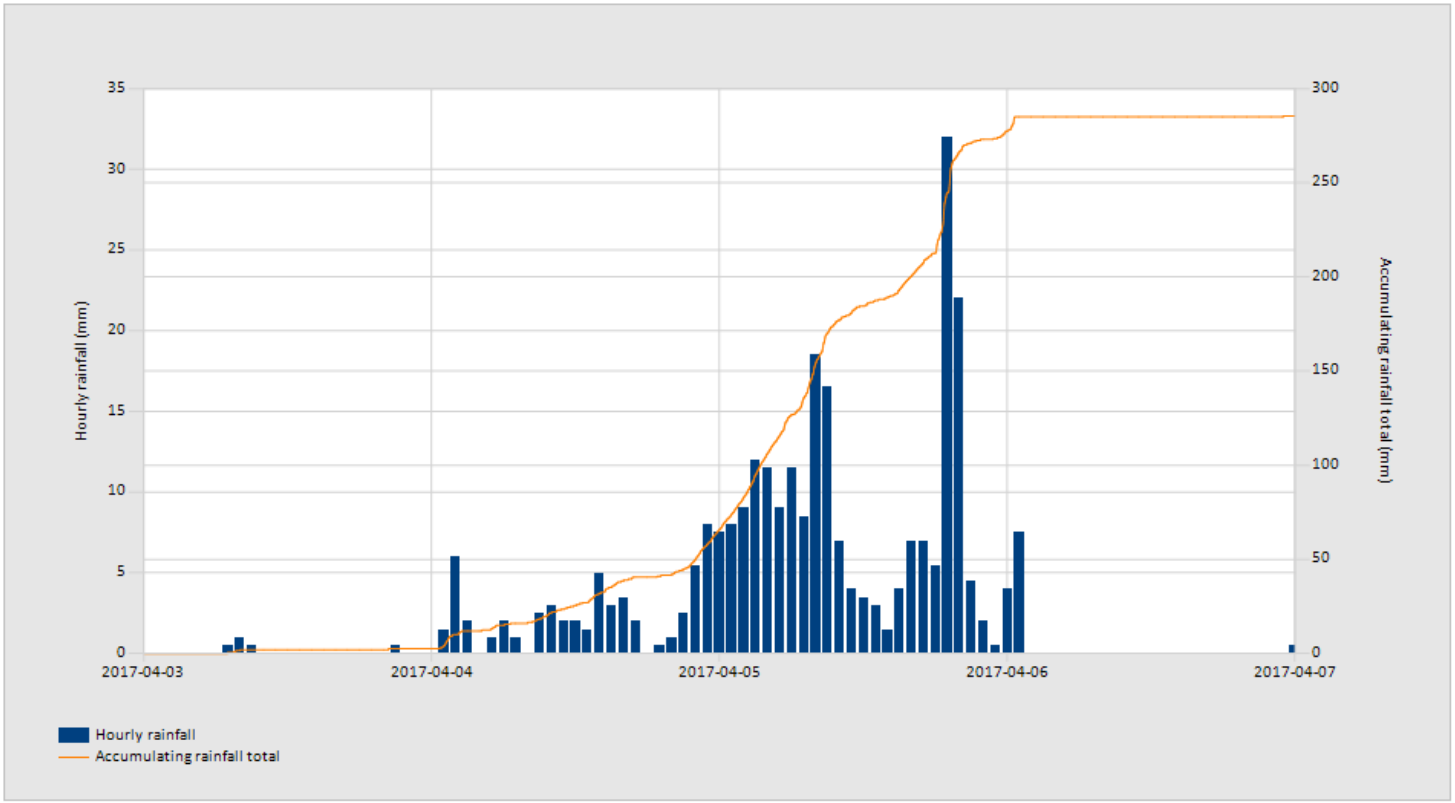
Period Selected: 2017-04-03 00:00:00 - 2017-04-07 00:00:00



Tarapounamu ?

Whakatane at Huitieke Upper

Period Selected: 2017-04-03 00:00:00 - 2017-04-07 00:00:00

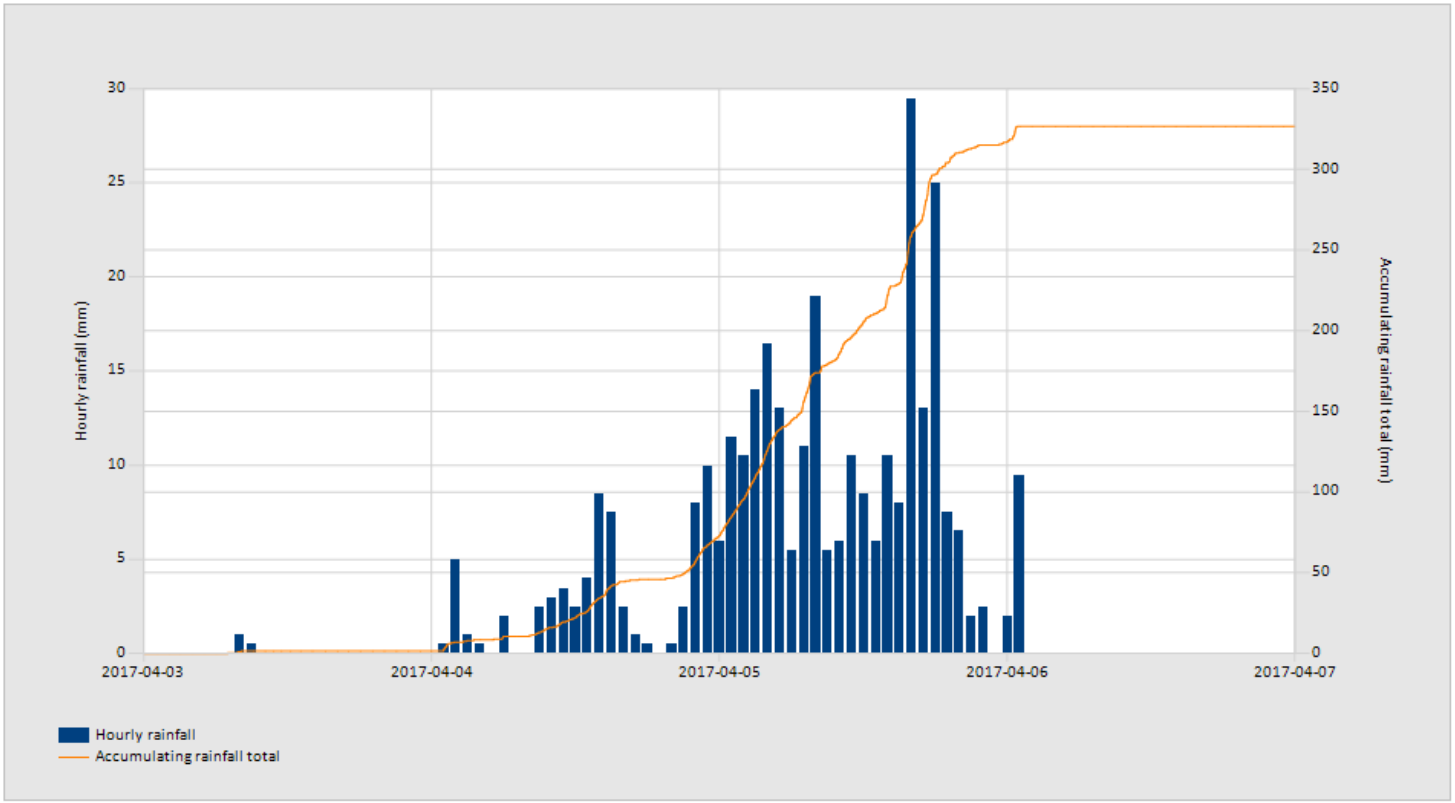


BAY OF PLENTY REGIONAL COUNCIL TOI MOANA

Tauranga at Ogilvies Bridge

Apr 27, 2017 | 1 of 1

Period Selected: 2017-04-03 00:00:00 - 2017-04-07 00:00:00

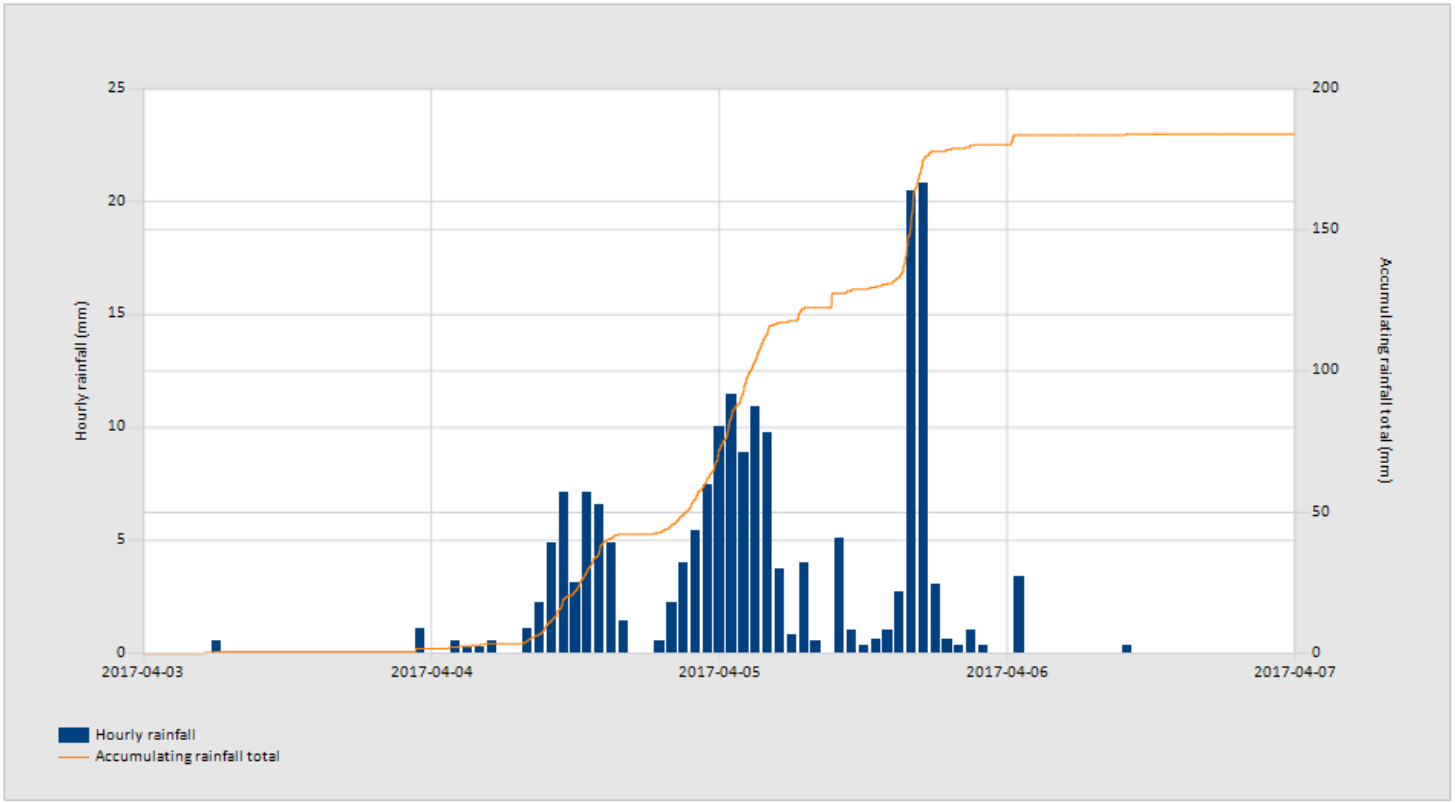


BAY OF PLENTY REGIONAL COUNCIL TOI MOANA

Whakatane at Kopeopeo

Apr 27, 2017 | 1 of 1

Period Selected: 2017-04-03 00:00:00 - 2017-04-07 00:00:00



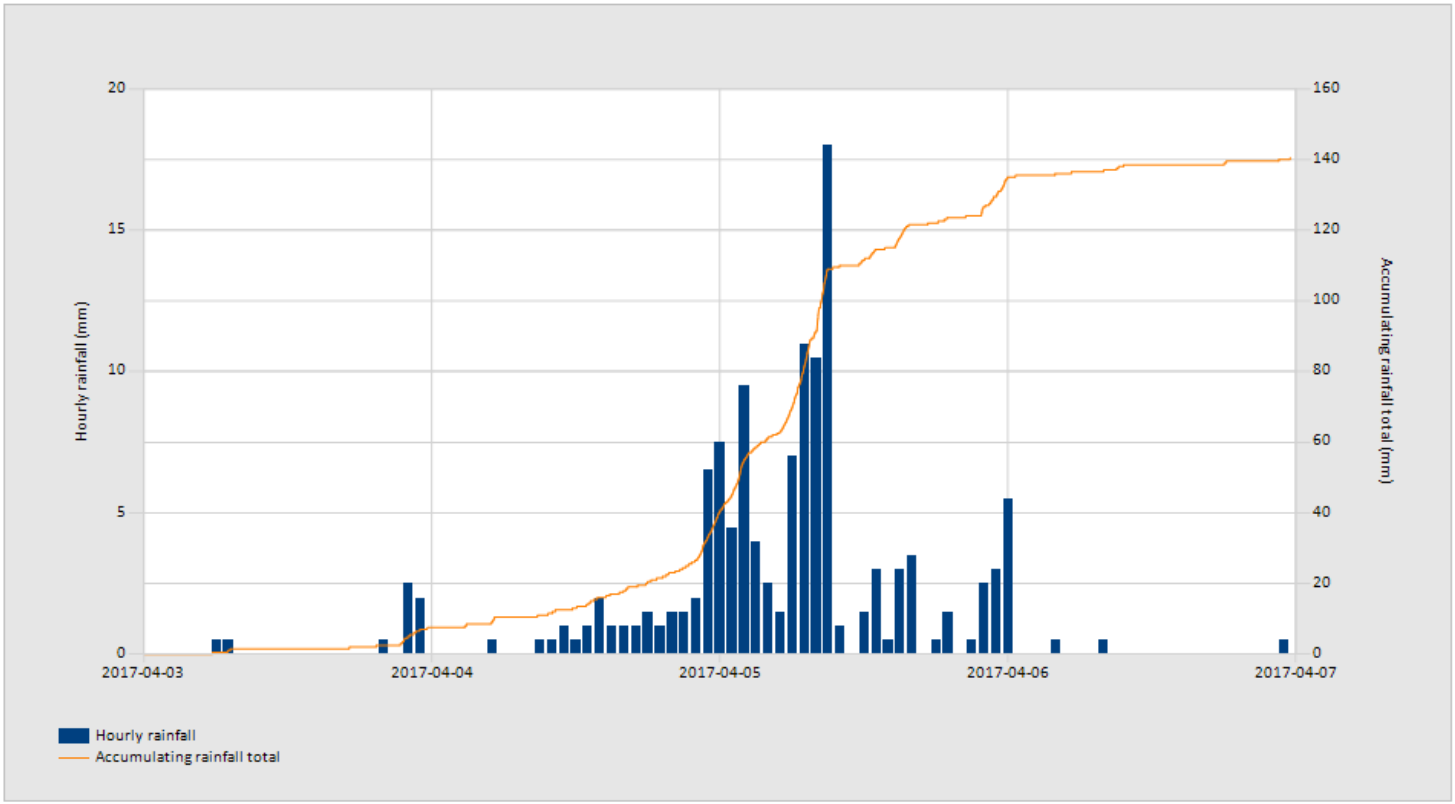
Appendix 6: Rangitāiki Catchment Rainfall Hyetographs

BAY OF PLENTY REGIONAL COUNCIL TOI MOANA

Rangitaiki at Kokomoka

Apr 28, 2017 | 1 of 1

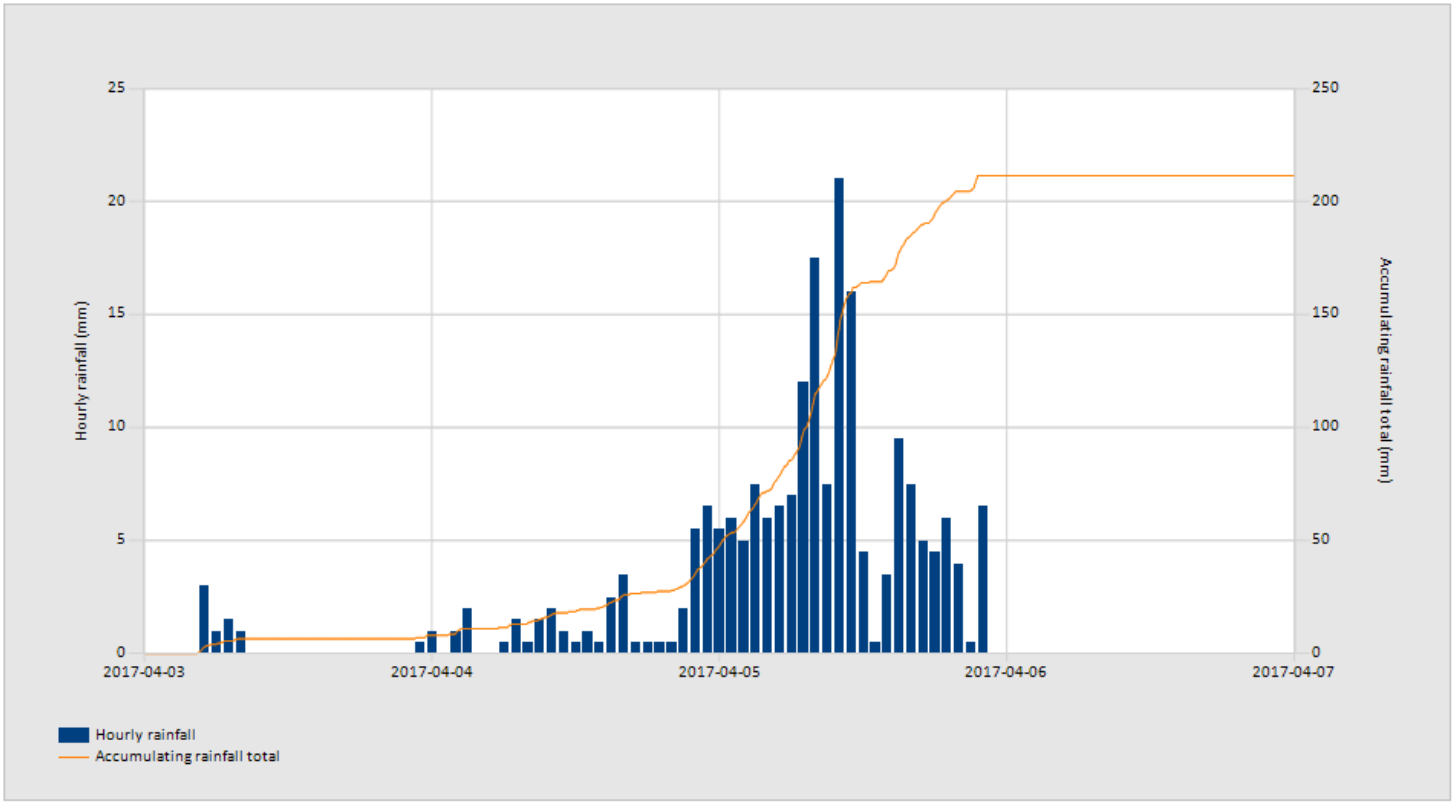
Period Selected: 2017-04-03 00:00:00 - 2017-04-07 00:00:00



BAY OF PLENTY REGIONAL COUNCIL TOI MOANA

Whirinaki at Galatea (provided by NIWA)

Period Selected: 2017-04-03 00:00:00 - 2017-04-07 00:00:00

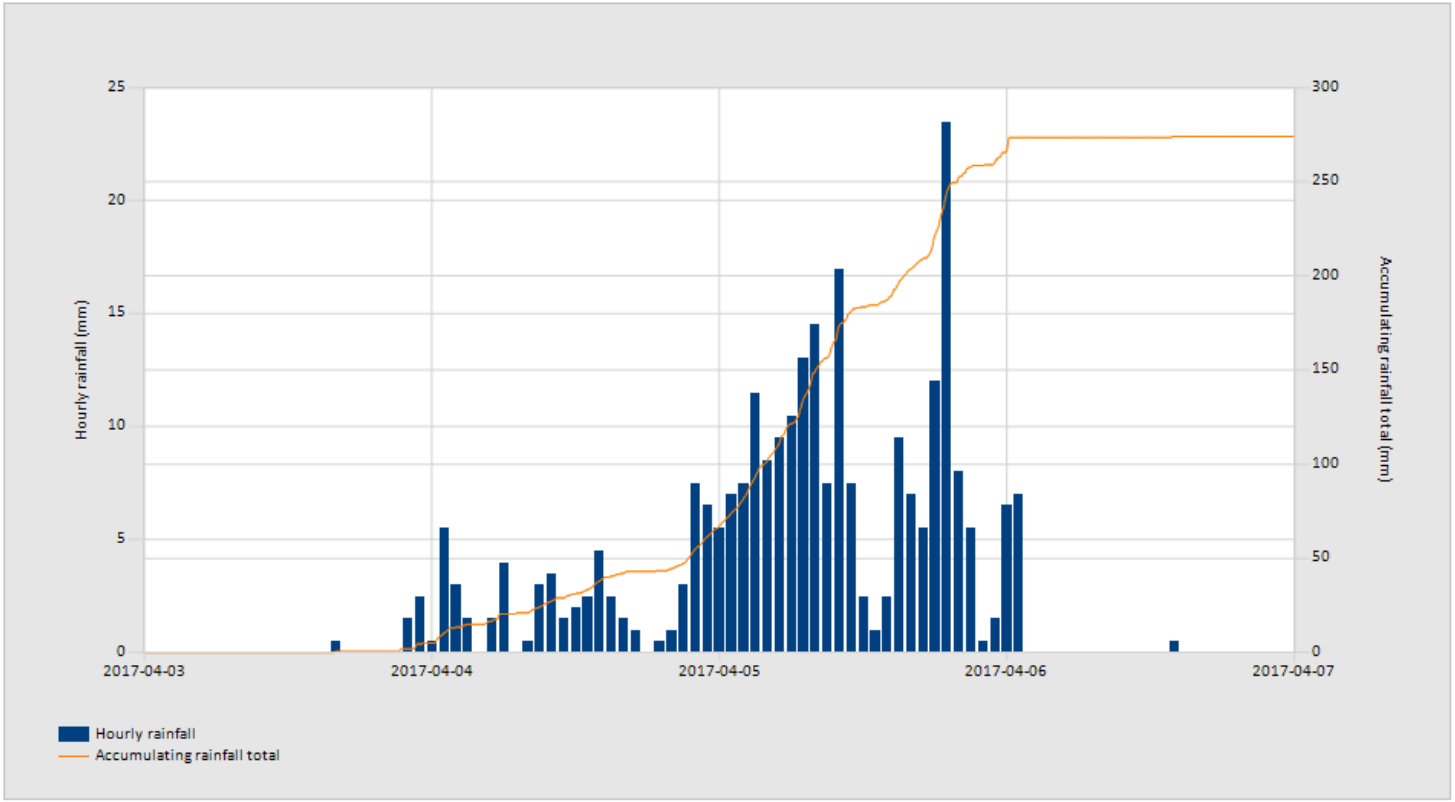


BAY OF PLENTY REGIONAL COUNCIL TOI MOANA

Rangitaiki at Aniwhenua (provided by Trustpower)

May 4, 2017 | 1 of 1

Period Selected: 2017-04-03 00:00:00 - 2017-04-07 00:00:00

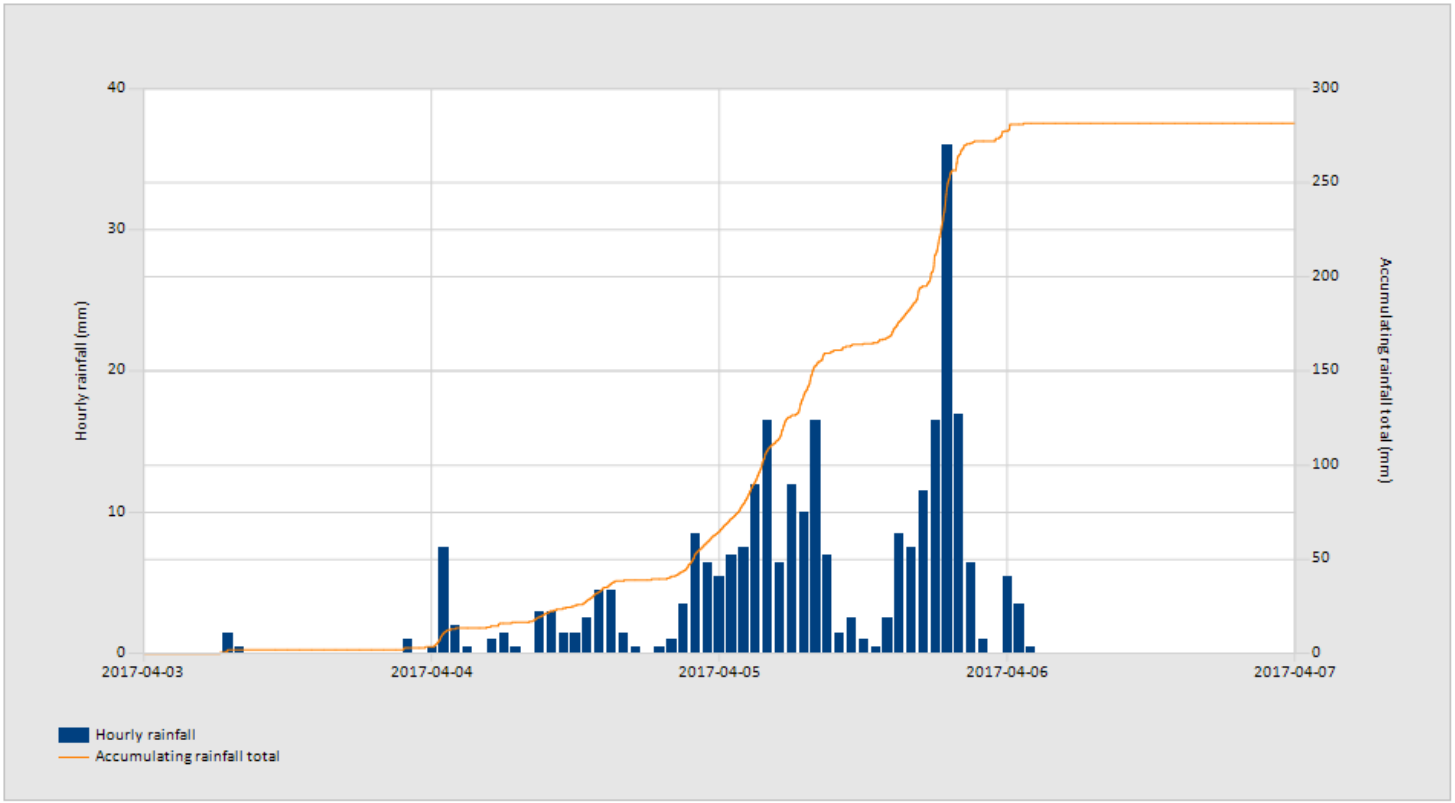


BAY OF PLENTY REGIONAL COUNCIL TOI MOANA

Waihua at Clearing

Apr 27, 2017 | 1 of 1

Period Selected: 2017-04-03 00:00:00 - 2017-04-07 00:00:00

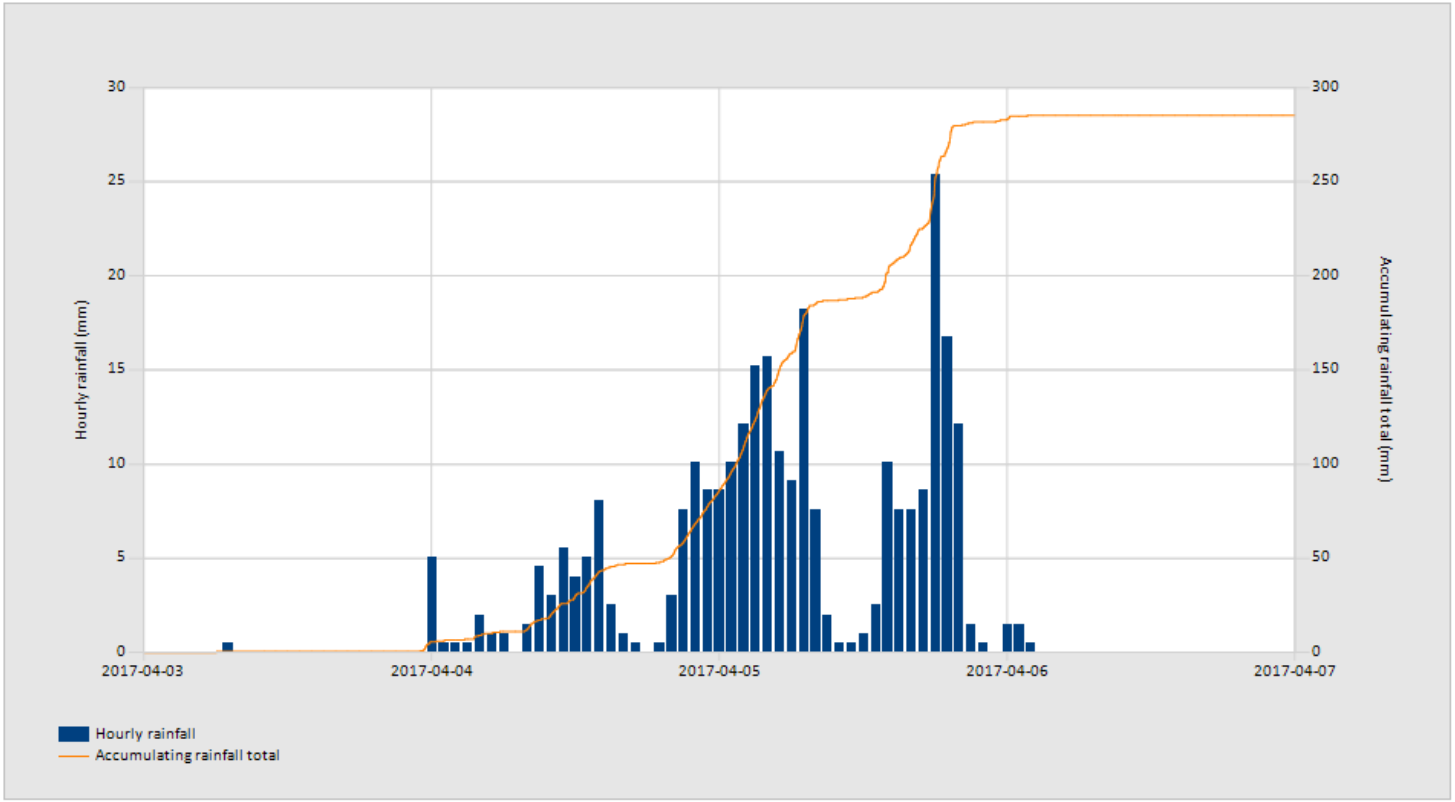


BAY OF PLENTY REGIONAL COUNCIL TOI MOANA

Rangitaiki at Te Teko

Apr 27, 2017 | 1 of 1

Period Selected: 2017-04-03 00:00:00 - 2017-04-07 00:00:00

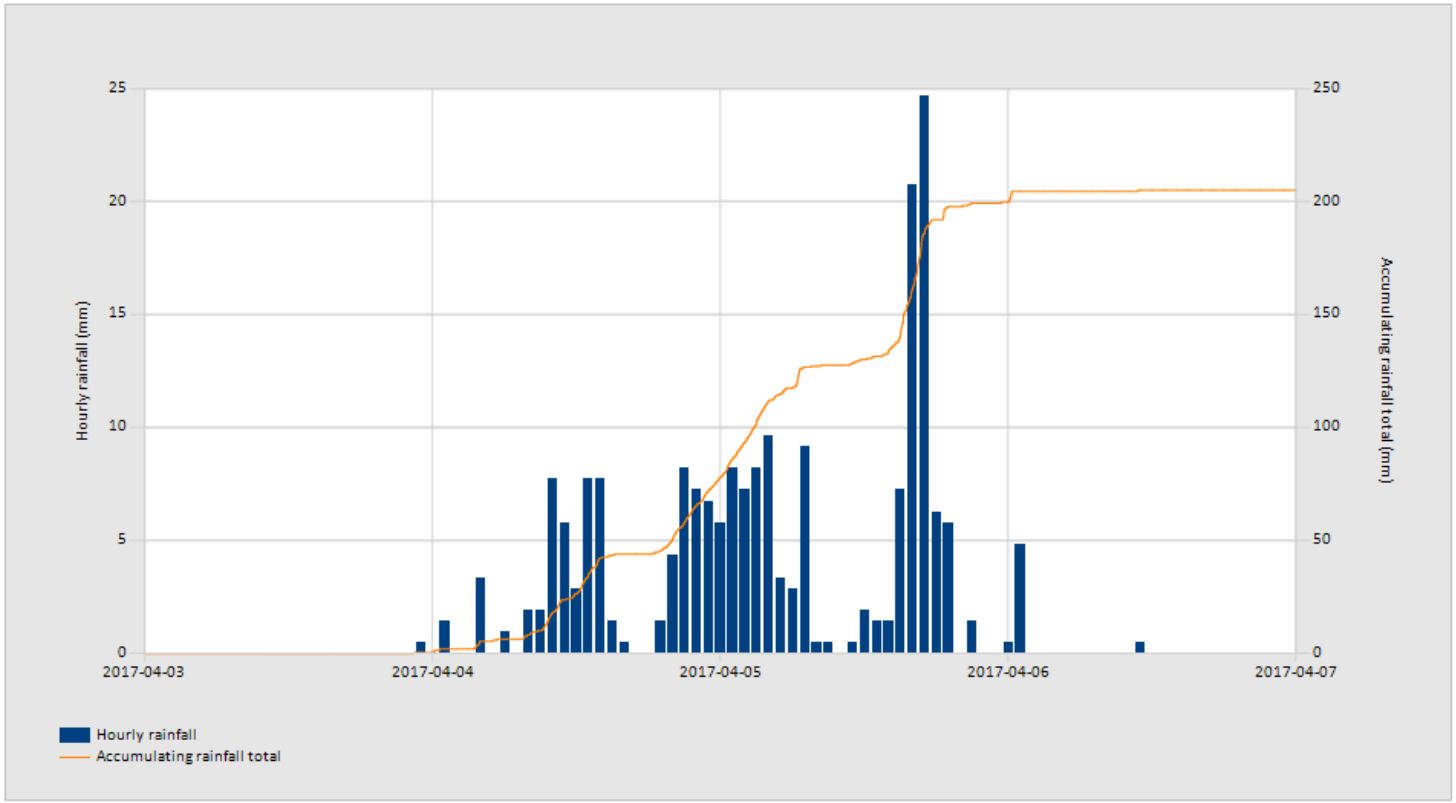


BAY OF PLENTY REGIONAL COUNCIL TOI MOANA

Rangitaiki at Thornton

Apr 27, 2017 | 1 of 1

Period Selected: 2017-04-03 00:00:00 - 2017-04-07 00:00:00



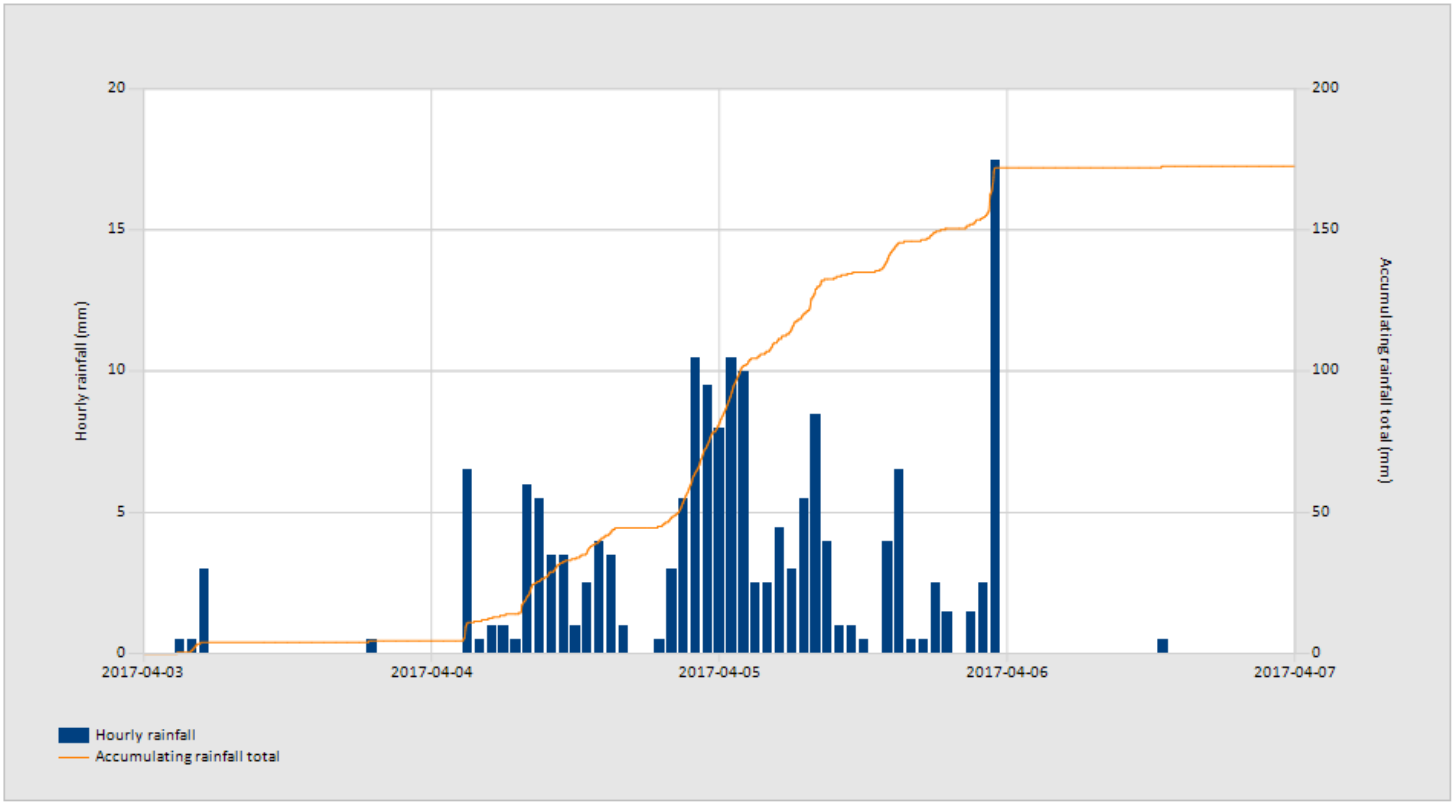
Appendix 7: Kaituna Catchment Rainfall Hyetographs

BAY OF PLENTY REGIONAL COUNCIL TOI MOANA

Kaituna at Whakarewarewa

Apr 28, 2017 | 1 of 1

Period Selected: 2017-04-03 00:00:00 - 2017-04-07 00:00:00

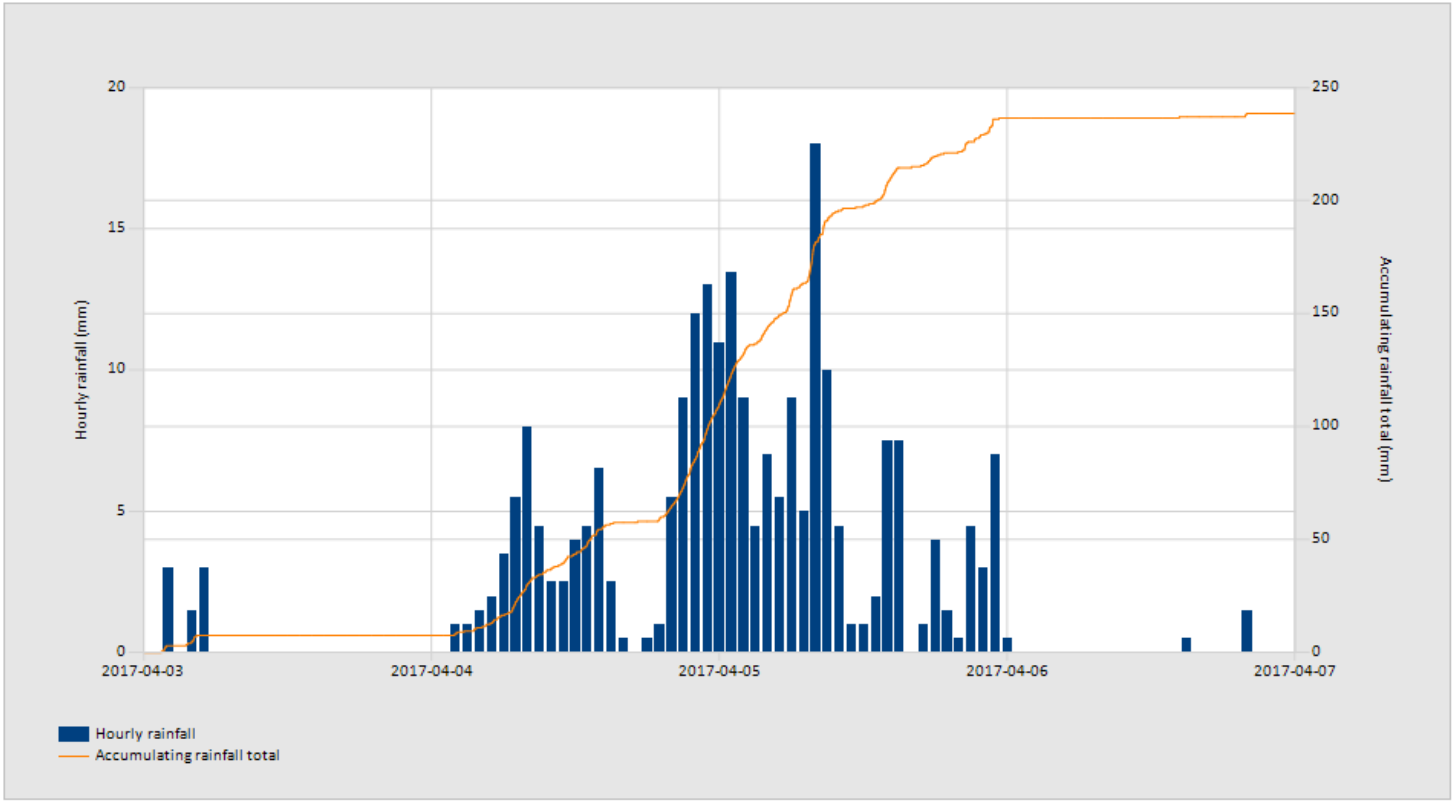


BAY OF PLENTY REGIONAL COUNCIL TOI MOANA

Mangorewa at Kaharoa

Apr 28, 2017 | 1 of 1

Period Selected: 2017-04-03 00:00:00 - 2017-04-07 00:00:00

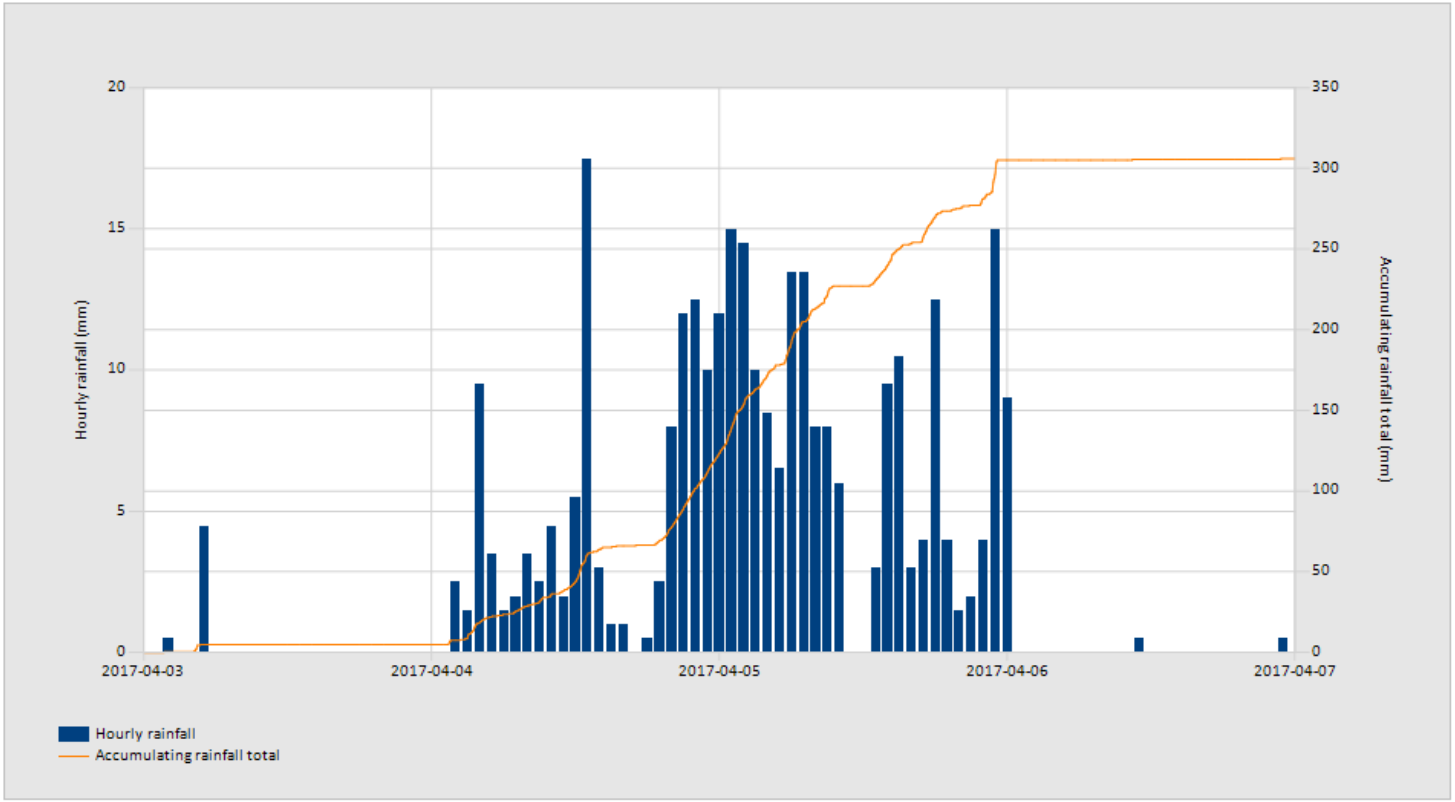


BAY OF PLENTY REGIONAL COUNCIL TOI MOANA

Mangorewa at Mangorewa Link

Apr 28, 2017 | 1 of 1

Period Selected: 2017-04-03 00:00:00 - 2017-04-07 00:00:00

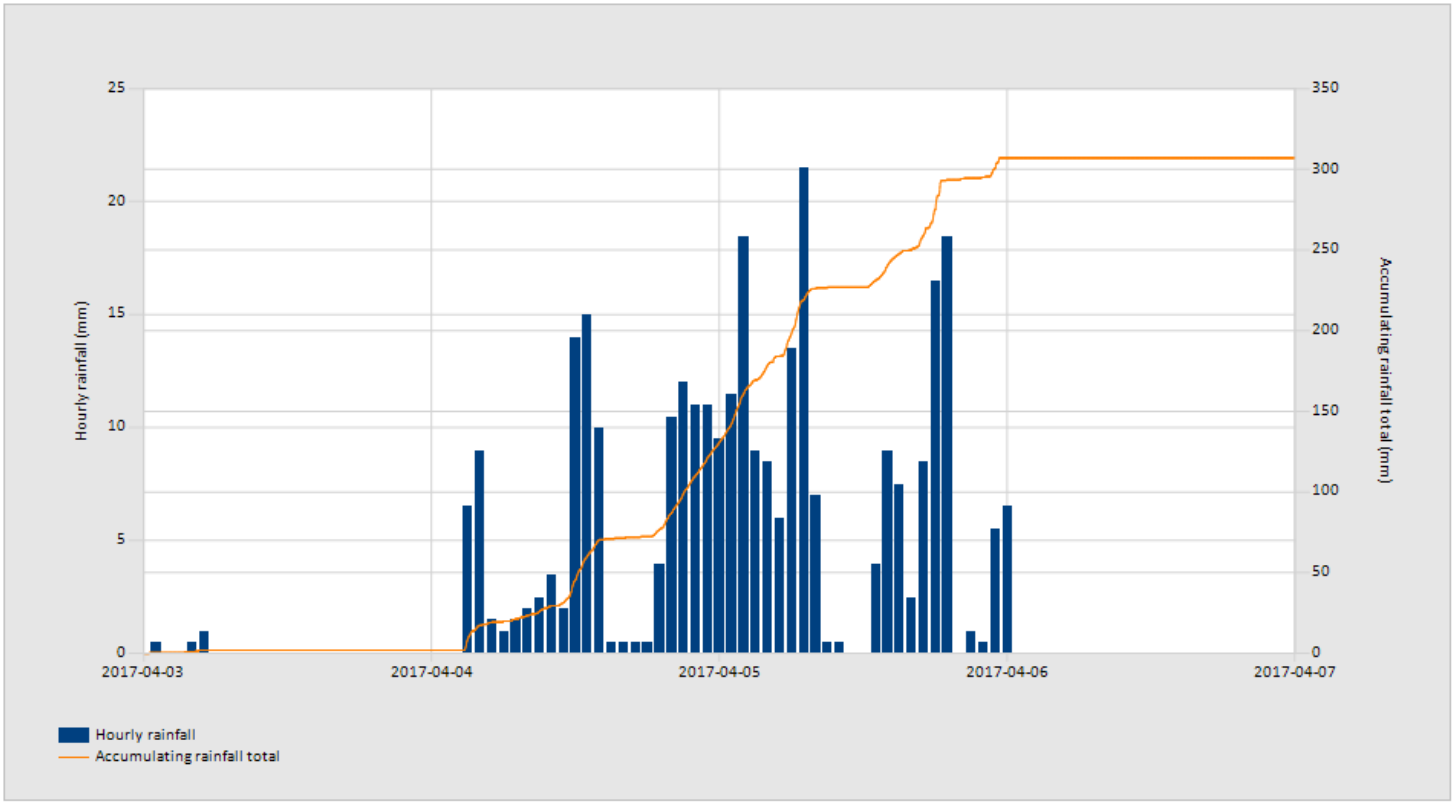


BAY OF PLENTY REGIONAL COUNCIL TOI MOANA

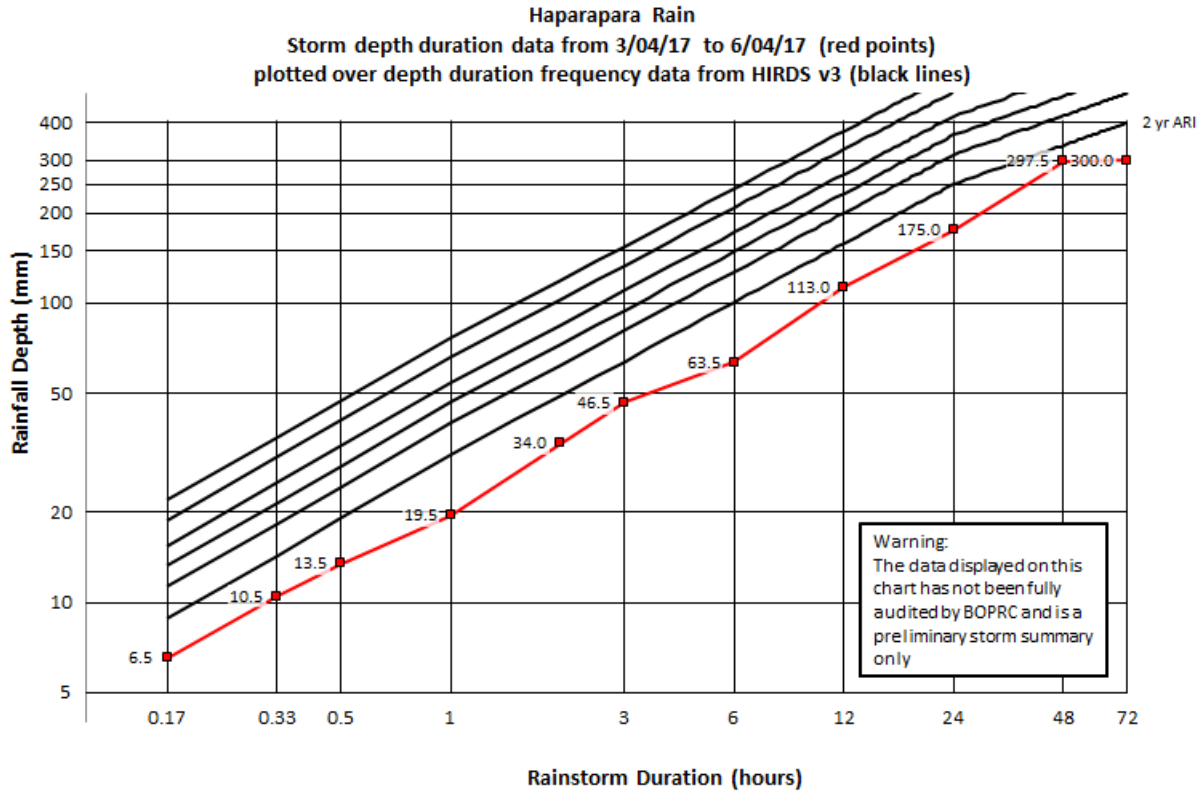
Kaituna at Te Matai

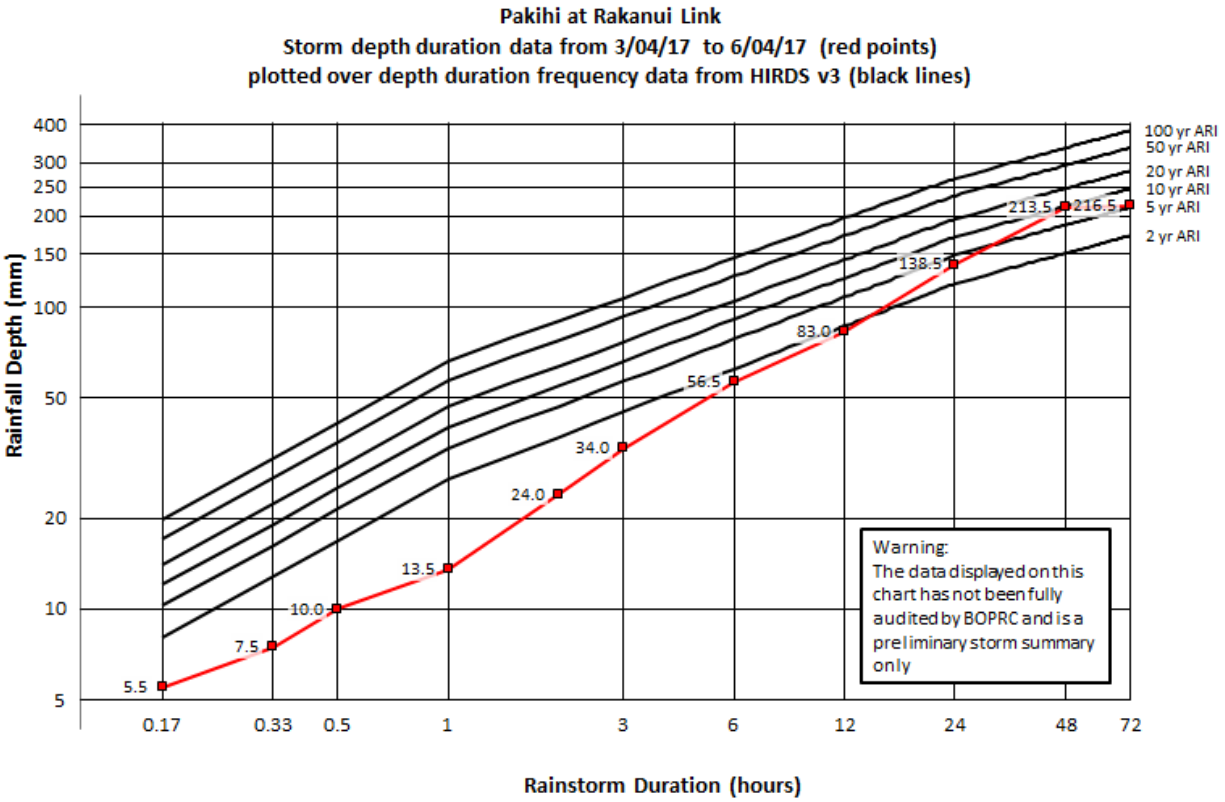
Apr 28, 2017 | 1 of 1

Period Selected: 2017-04-03 00:00:00 - 2017-04-07 00:00:00

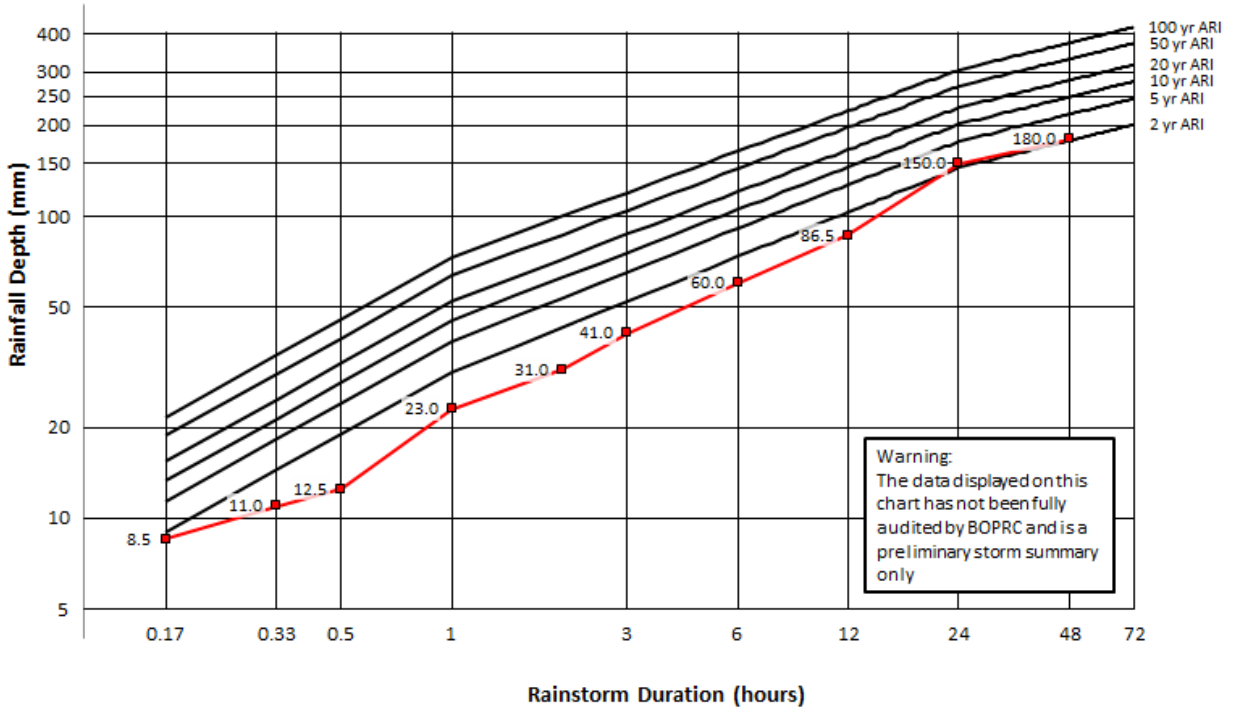


Appendix 8: Storm depth-duration frequency data

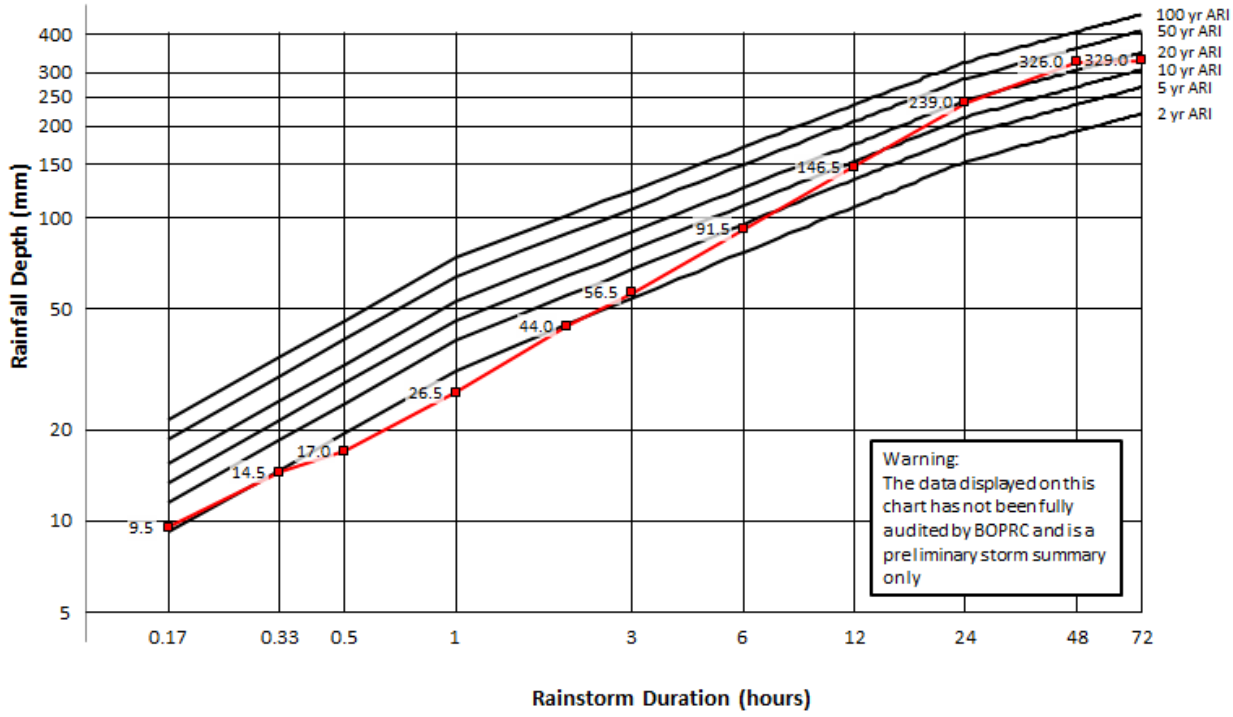


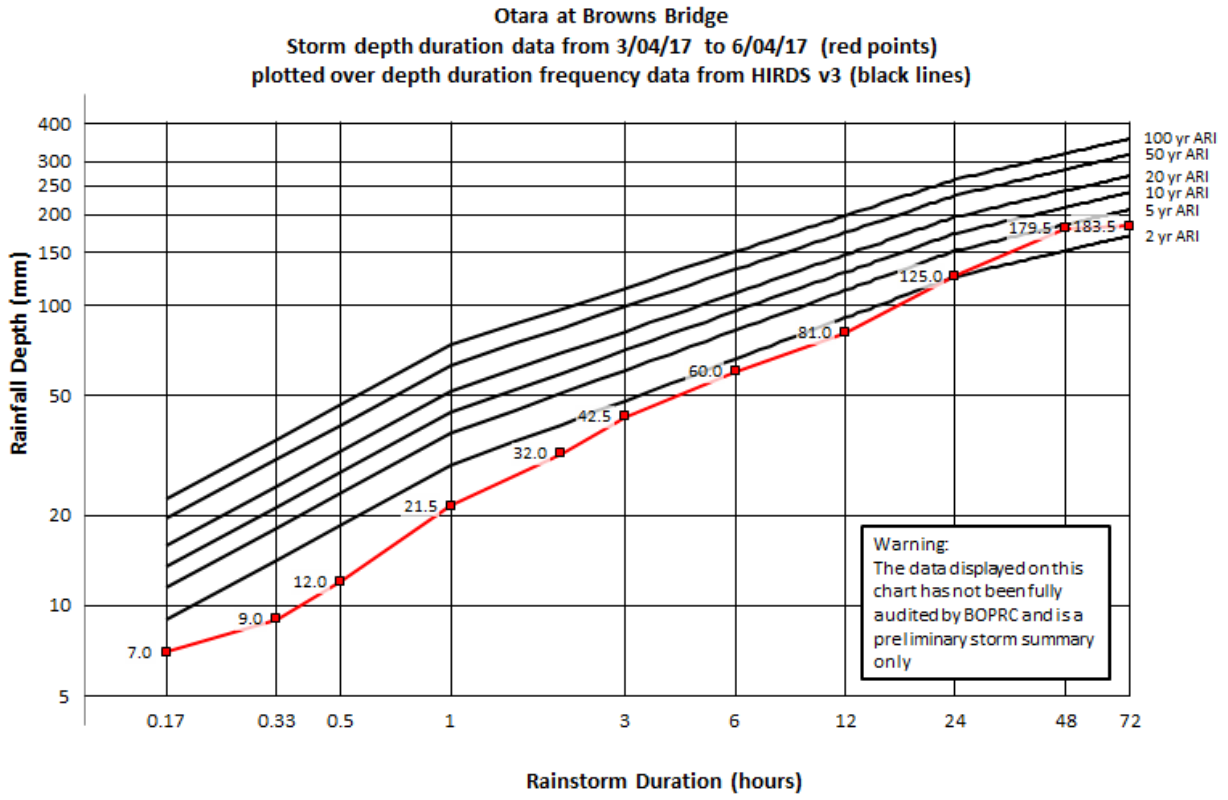


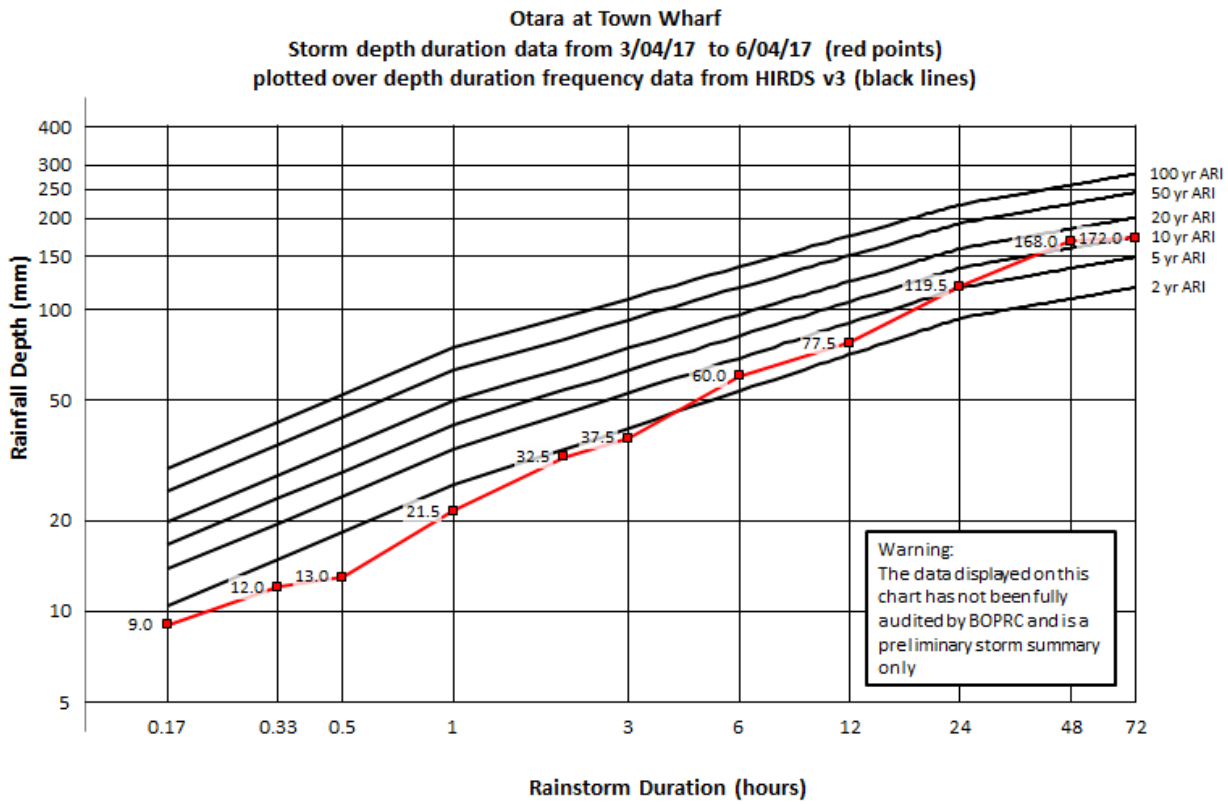
Pakihi at Pakihi Stn
Storm depth duration data from 3/04/17 to 6/04/17 (red points)
plotted over depth duration frequency data from HIRDS v3 (black lines)

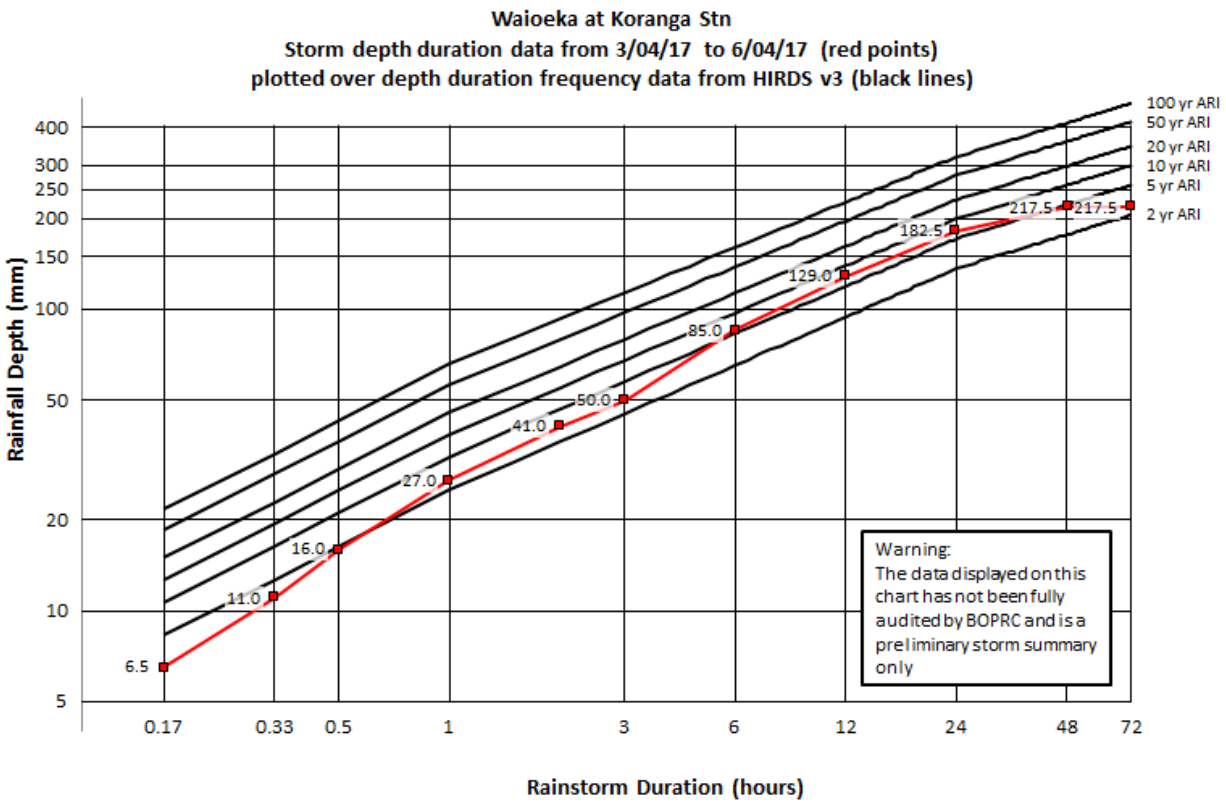


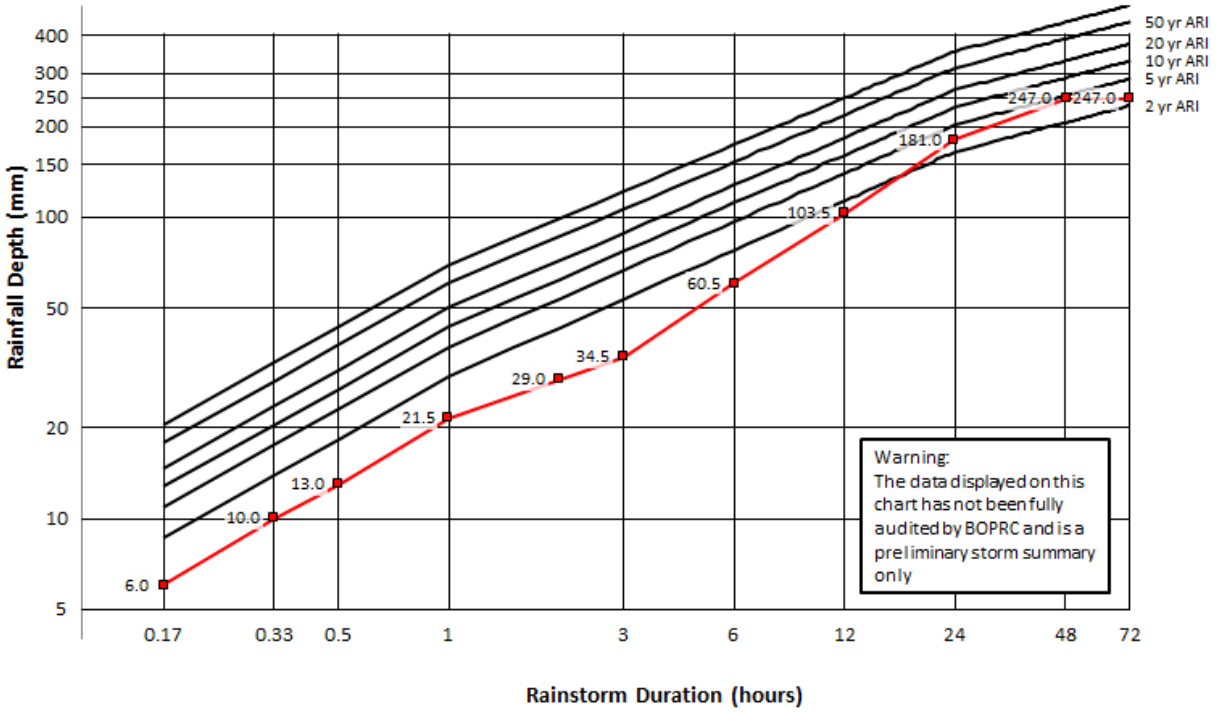
Otara at Tutaetoko
Storm depth duration data from 3/04/17 to 6/04/17 (red points)
plotted over depth duration frequency data from HIRDS v3 (black lines)



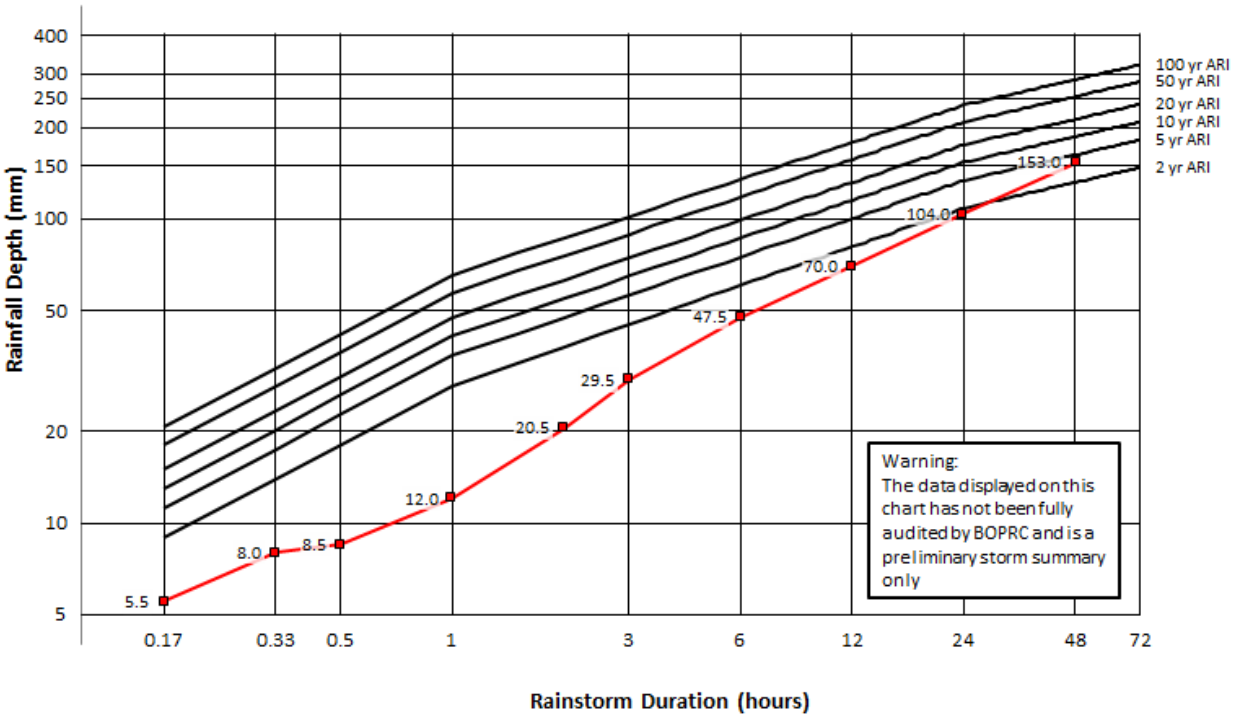

Otara at Browns Bridge
Storm depth duration data from 3/04/17 to 6/04/17 (red points)
plotted over depth duration frequency data from HIRDS v3 (black lines)
Rainfall Depth (mm)
400
300
250
200
150
100
50
20
10
5
0.17
0.33
0.5
1
3
6
12
24
48
72
Rainstorm Duration (hours)
100 yr ARI
50 yr ARI
20 yr ARI
10 yr ARI
5 yr ARI
2 yr ARI
7.0
9.0
12.0
21.5
32.0
42.5
60.0
81.0
125.0
179.5
183.5
Warning:
The data displayed on this chart has not been fully audited by BOPRC and is a preliminary storm summary only


Otara at Town Wharf
Storm depth duration data from 3/04/17 to 6/04/17 (red points)
plotted over depth duration frequency data from HIRDS v3 (black lines)
Rainfall Depth (mm)
400
300
250
200
150
100
50
20
10
5
0.17
0.33
0.5
1
3
6
12
24
48
72
Rainstorm Duration (hours)
100 yr ARI
50 yr ARI
20 yr ARI
10 yr ARI
5 yr ARI
2 yr ARI
9.0
12.0
13.0
21.5
32.5
37.5
60.0
77.5
119.5
168.0
172.0
Warning:
The data displayed on this chart has not been fully audited by BOPRC and is a preliminary storm summary only

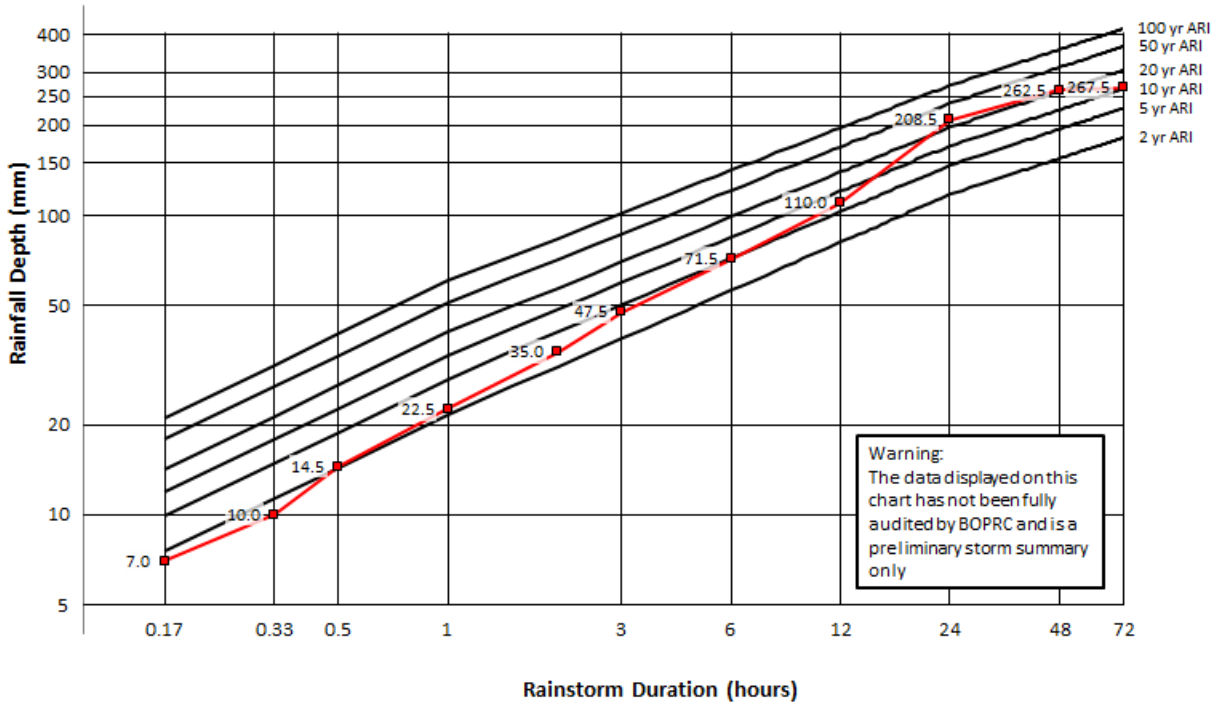

Waioeka at Koranga Stn
Storm depth duration data from 3/04/17 to 6/04/17 (red points)
plotted over depth duration frequency data from HIRDS v3 (black lines)
Rainfall Depth (mm)
400
300
250
200
150
100
50
20
10
5
0.17
0.33
0.5
1
3
6
12
24
48
72
Rainstorm Duration (hours)
100 yr ARI
50 yr ARI
20 yr ARI
10 yr ARI
5 yr ARI
2 yr ARI
6.5
11.0
16.0
27.0
41.0
50.0
85.0
129.0
182.5
217.5
217.5
Warning:
The data displayed on this chart has not been fully audited by BOPRC and is a preliminary storm summary only


Waioeka at Cableway
Storm depth duration data from 3/04/17 to 6/04/17 (red points)
plotted over depth duration frequency data from HIRDS v3 (black lines)
Rainfall Depth (mm)
400
300
250
200
150
100
50
20
10
5
0.17
0.33
0.5
1
3
6
12
24
48
72
Rainstorm Duration (hours)
50 yr ARI
20 yr ARI
10 yr ARI
5 yr ARI
2 yr ARI
6.0
10.0
13.0
21.5
29.0
34.5
60.5
103.5
181.0
247.0
247.0
Warning:
The data displayed on this chart has not been fully audited by BOPRC and is a preliminary storm summary only

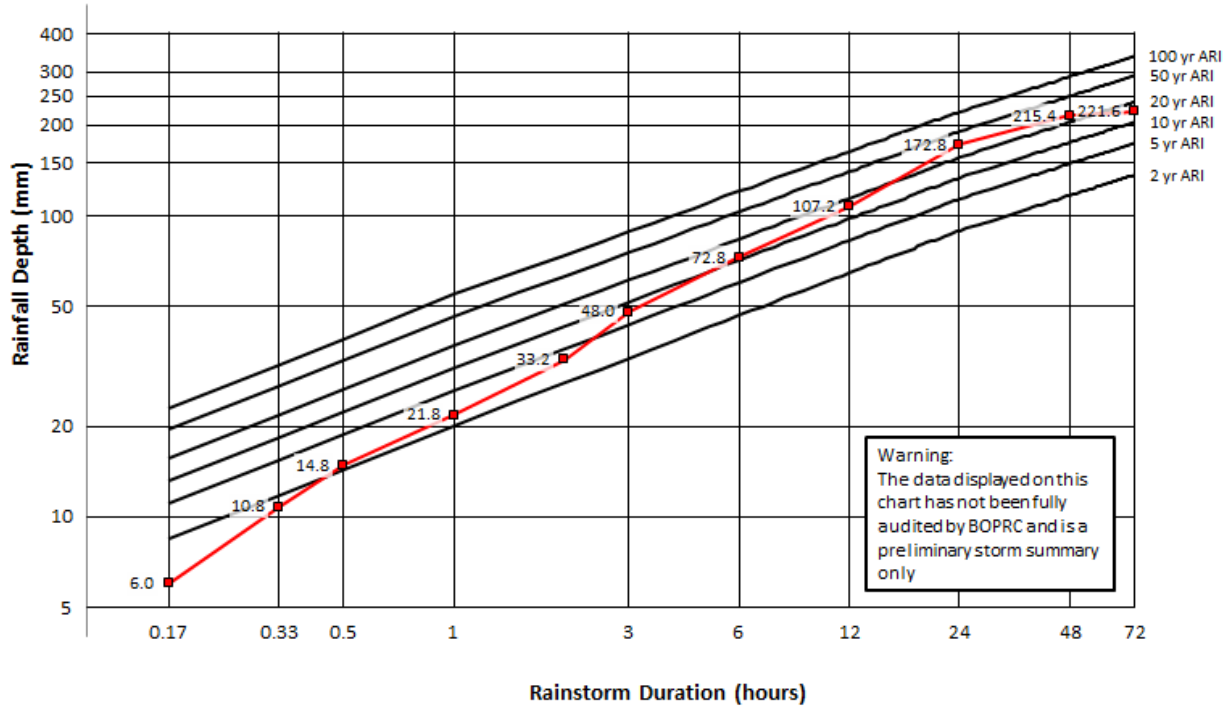
Waioeka at Mouth Of Gorge
Storm depth duration data from 3/04/17 to 6/04/17 (red points)
plotted over depth duration frequency data from HIRDS v3 (black lines)



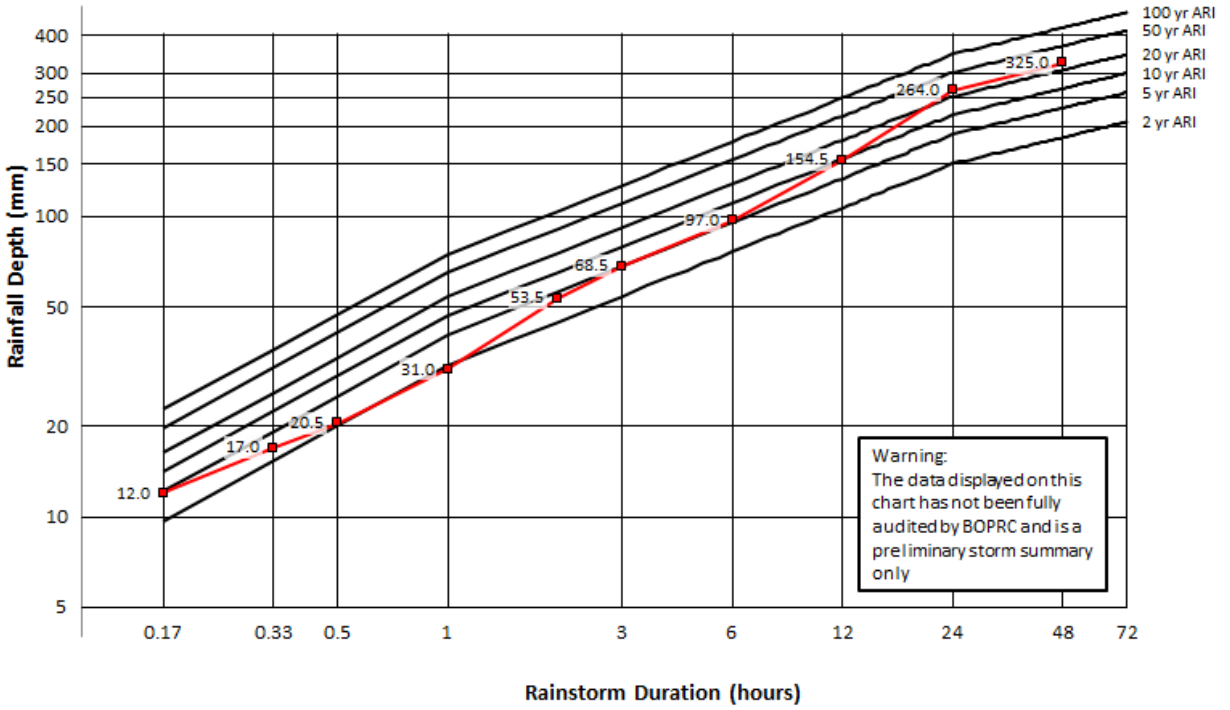
Huiarau at Huiarau Summit
Storm depth duration data from 3/04/17 to 6/04/17 (red points)
plotted over depth duration frequency data from HIRDS v3 (black lines)



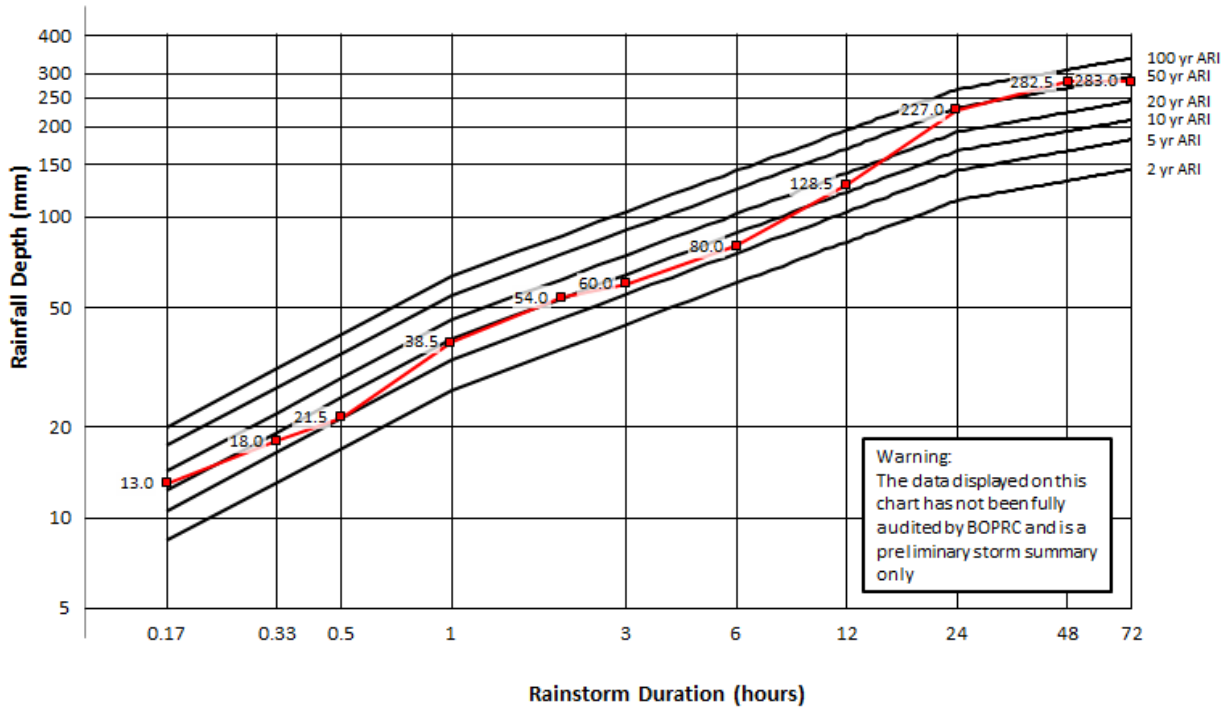
Tarapounamu at Summit
Storm depth duration data from 3/04/17 to 6/04/17 (red points)
plotted over depth duration frequency data from HIRDS v3 (black lines)



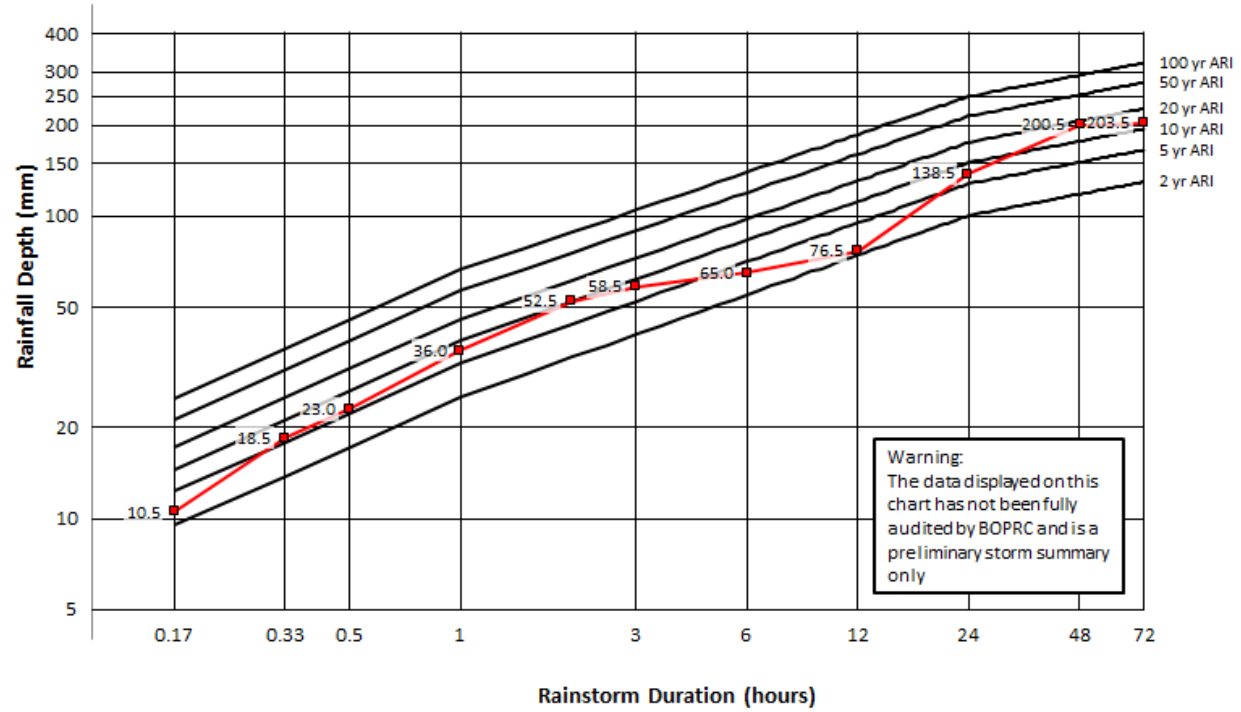
Waimana at Ogilvies
Storm depth duration data from 3/04/17 to 6/04/17 (red points)
plotted over depth duration frequency data from HIRDS v3 (black lines)



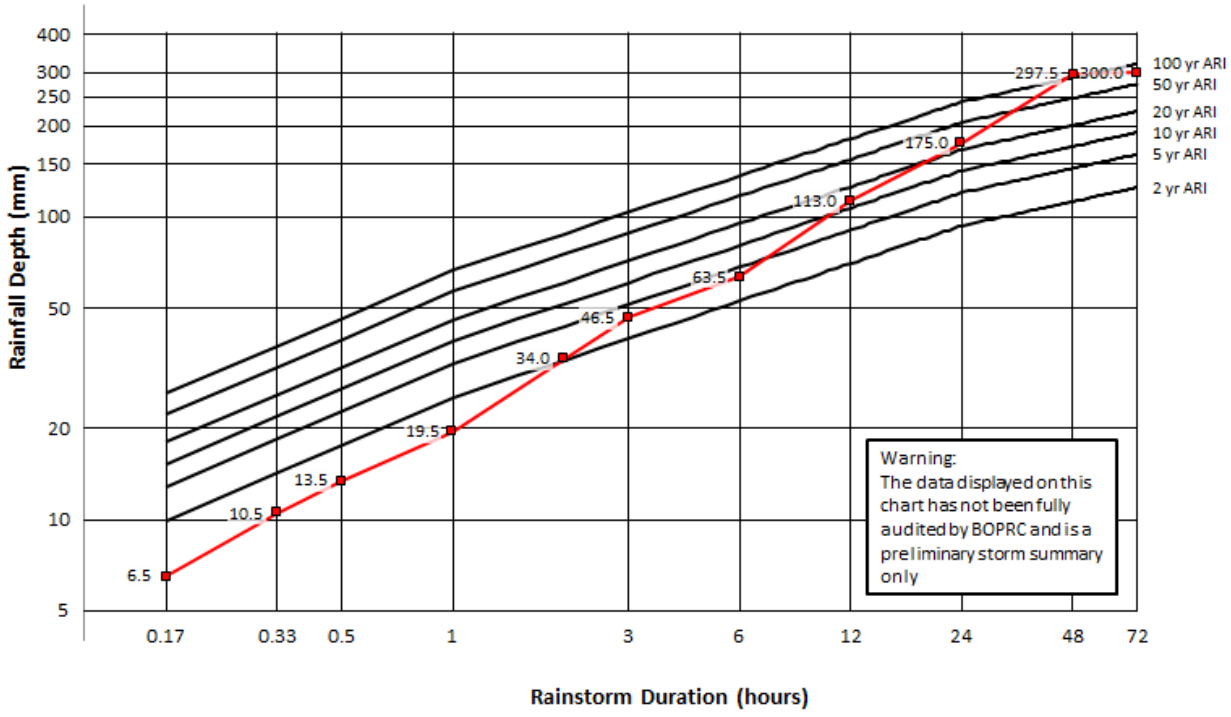
Whakatane at Huitieke Link
Storm depth duration data from 3/04/17 to 6/04/17 (red points)
plotted over depth duration frequency data from HIRDS v3 (black lines)



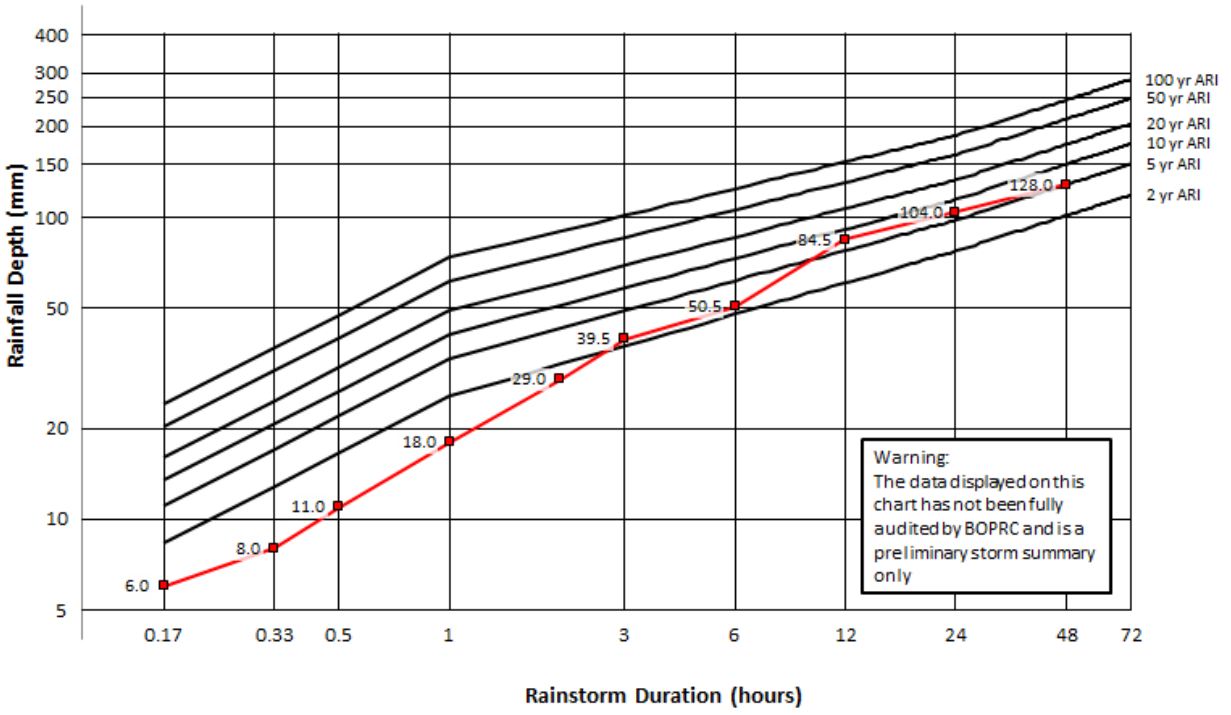
Wainui te Whara raingauge
Storm depth duration data from 3/04/17 to 6/04/17 (red points)
plotted over depth duration frequency data from HIRDS v3 (black lines)



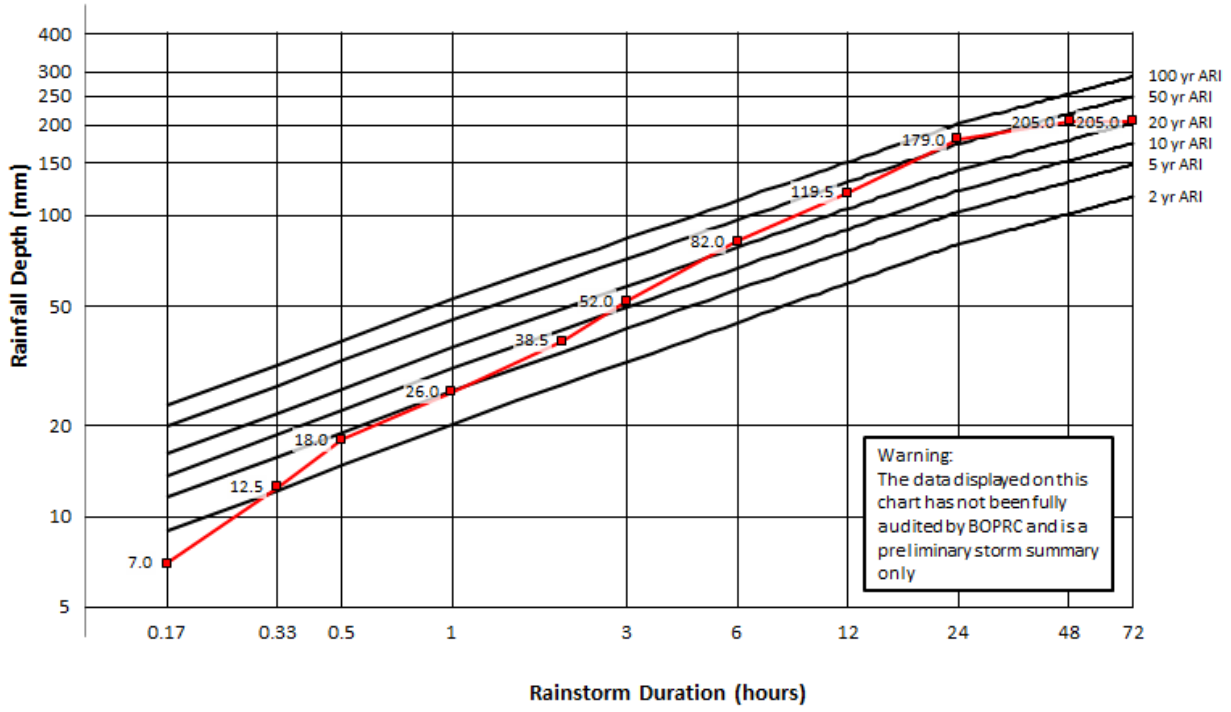
Whakatane at Kopeopeo
Storm depth duration data from 3/04/17 to 6/04/17 (red points)
plotted over depth duration frequency data from HIRDS v3 (black lines)



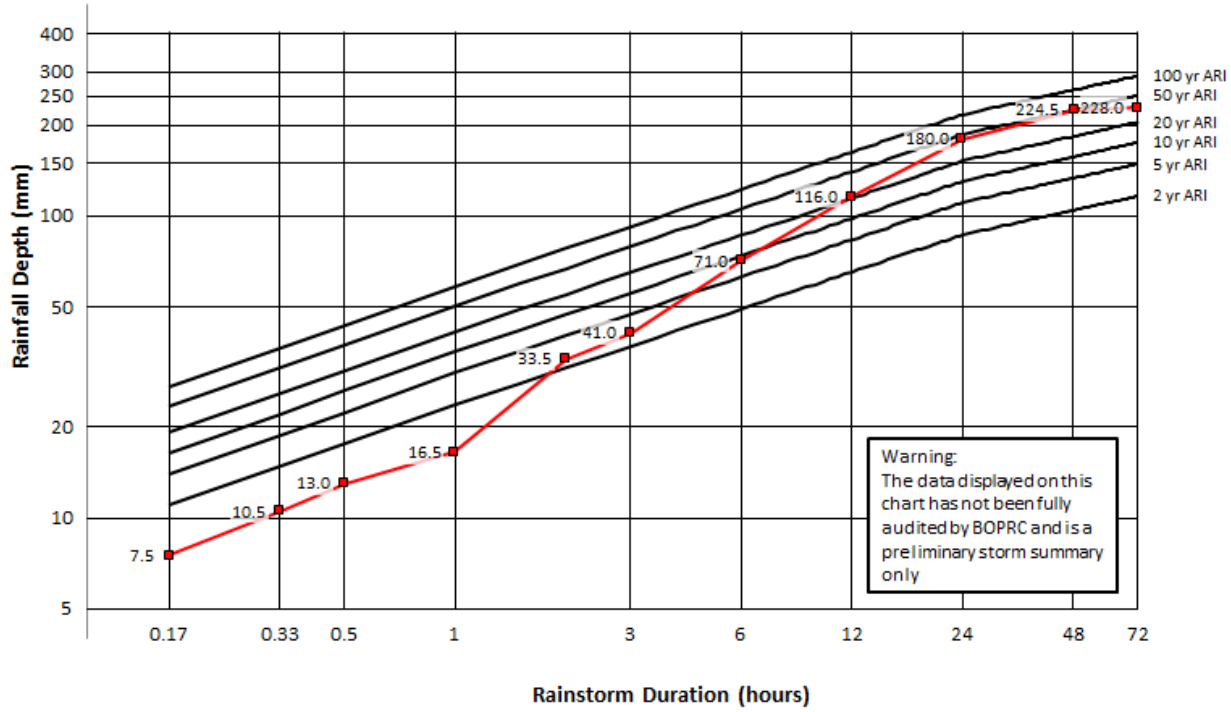
Rangitaiki at Kokomoka
Storm depth duration data from 3/04/17 to 6/04/17 (red points)
plotted over depth duration frequency data from HIRDS v3 (black lines)



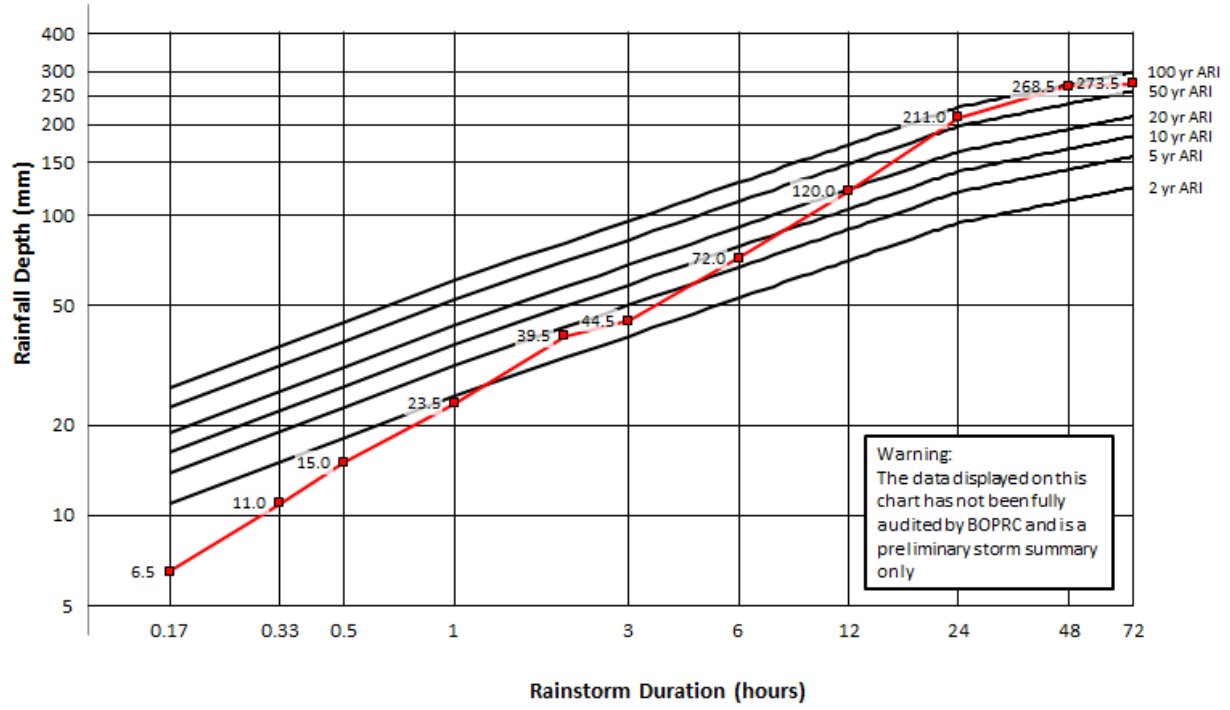
Whirinaki at Galatea
Storm depth duration data from 3/04/17 to 6/04/17 (red points)
plotted over depth duration frequency data from HIRDS v3 (black lines)



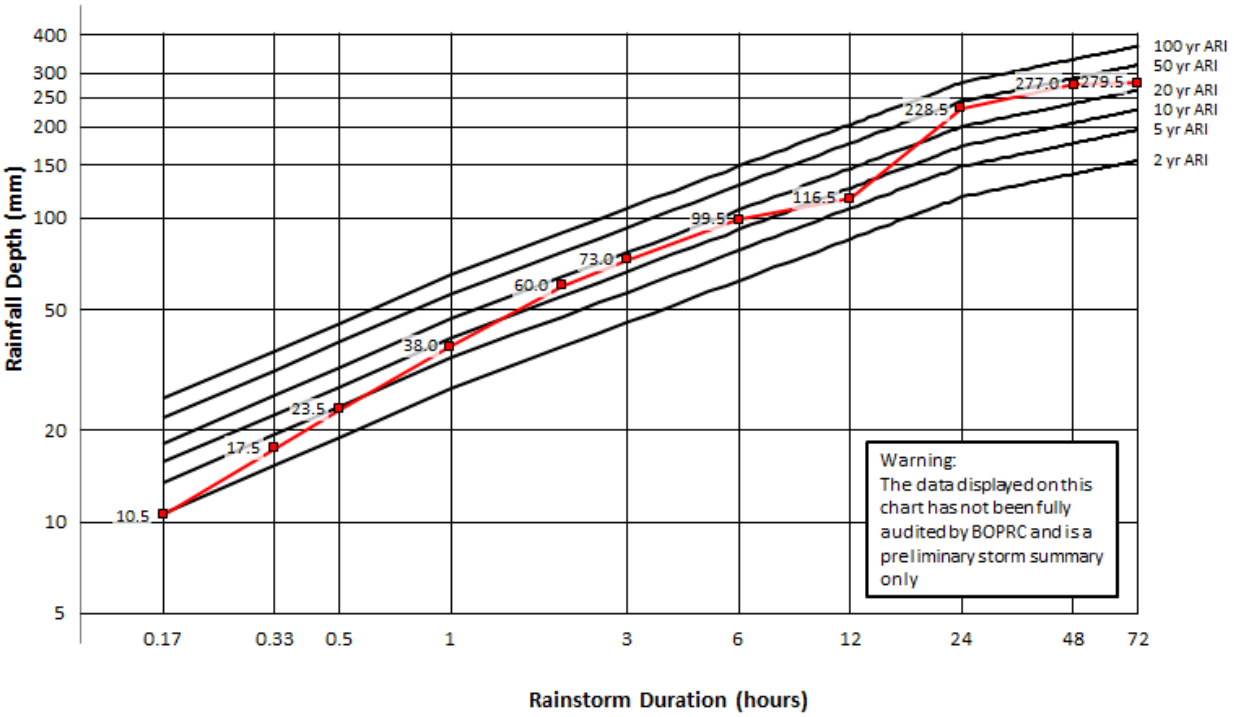
Galatea Basin
Storm depth duration data from 3/04/17 to 6/04/17 (red points)
plotted over depth duration frequency data from HIRDS v3 (black lines)

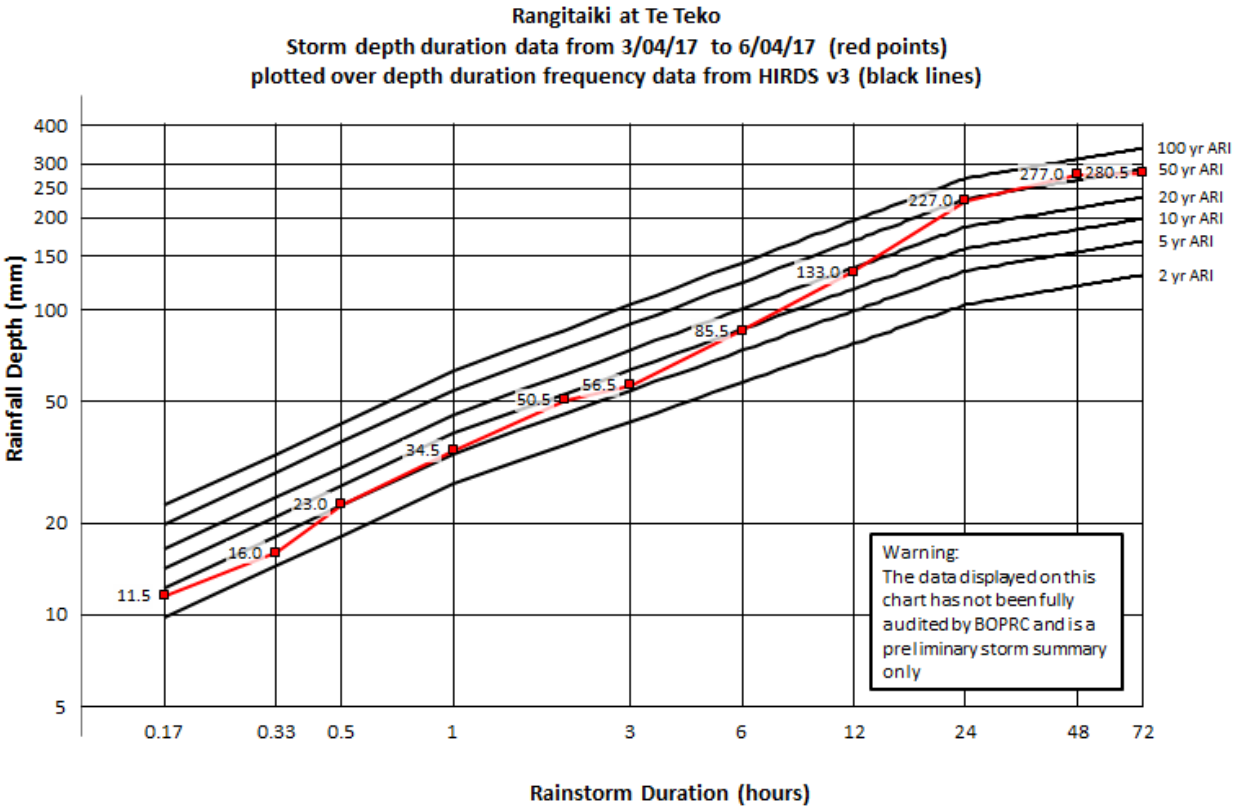


Rangitāiki at Aniwhenua
Storm depth duration data from 3/04/17 to 6/04/17 (red points)
plotted over depth duration frequency data from HIRDS v3 (black lines)



Waihua at Waihua Rain Gauge
Storm depth duration data from 3/04/17 to 6/04/17 (red points)
plotted over depth duration frequency data from HIRDS v3 (black lines)




Rangitaiki at Te Teko
Storm depth duration data from 3/04/17 to 6/04/17 (red points)
plotted over depth duration frequency data from HIRDS v3 (black lines)
Rainfall Depth (mm)
400
300
250
200
150
100
50
20
10
5
0.17
0.33
0.5
1
3
6
12
24
48
72
Rainstorm Duration (hours)
100 yr ARI
50 yr ARI
20 yr ARI
10 yr ARI
5 yr ARI
2 yr ARI
11.5
16.0
23.0
34.5
50.5
56.5
85.5
133.0
227.0
277.0
280.5
Warning:
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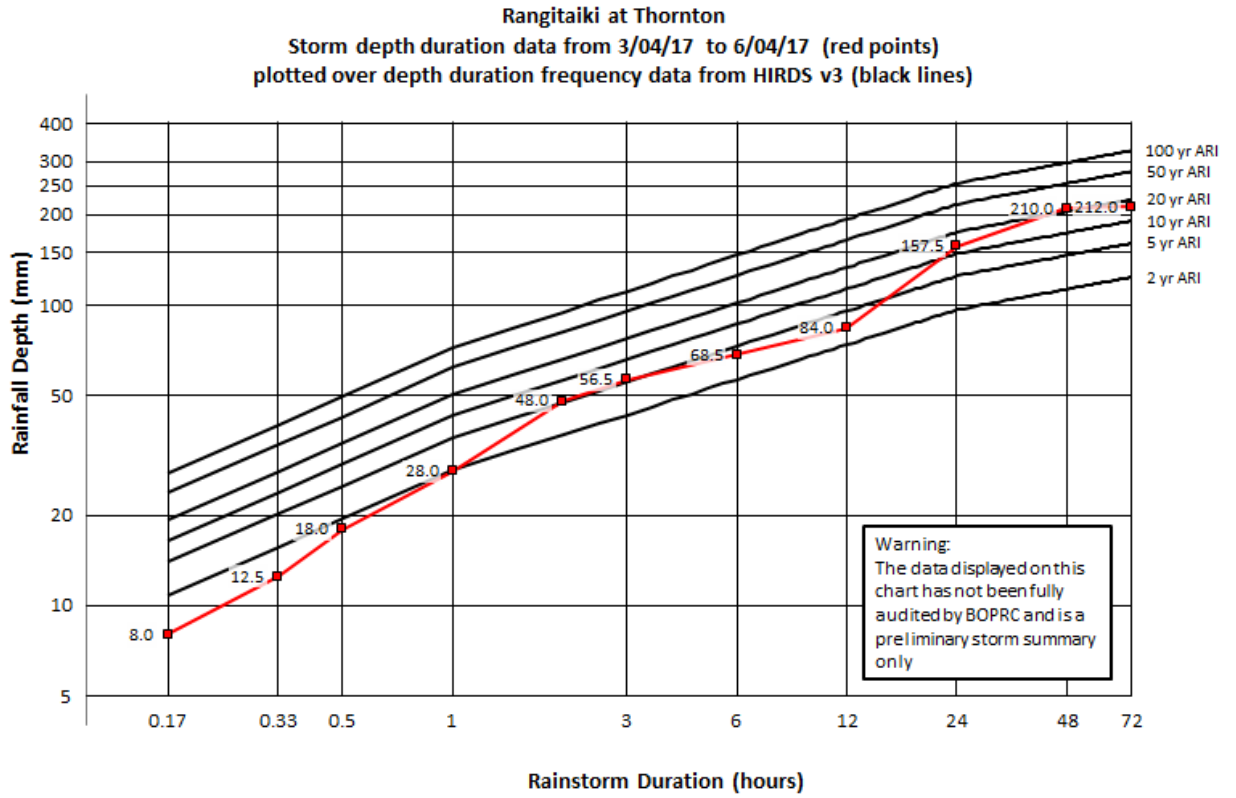
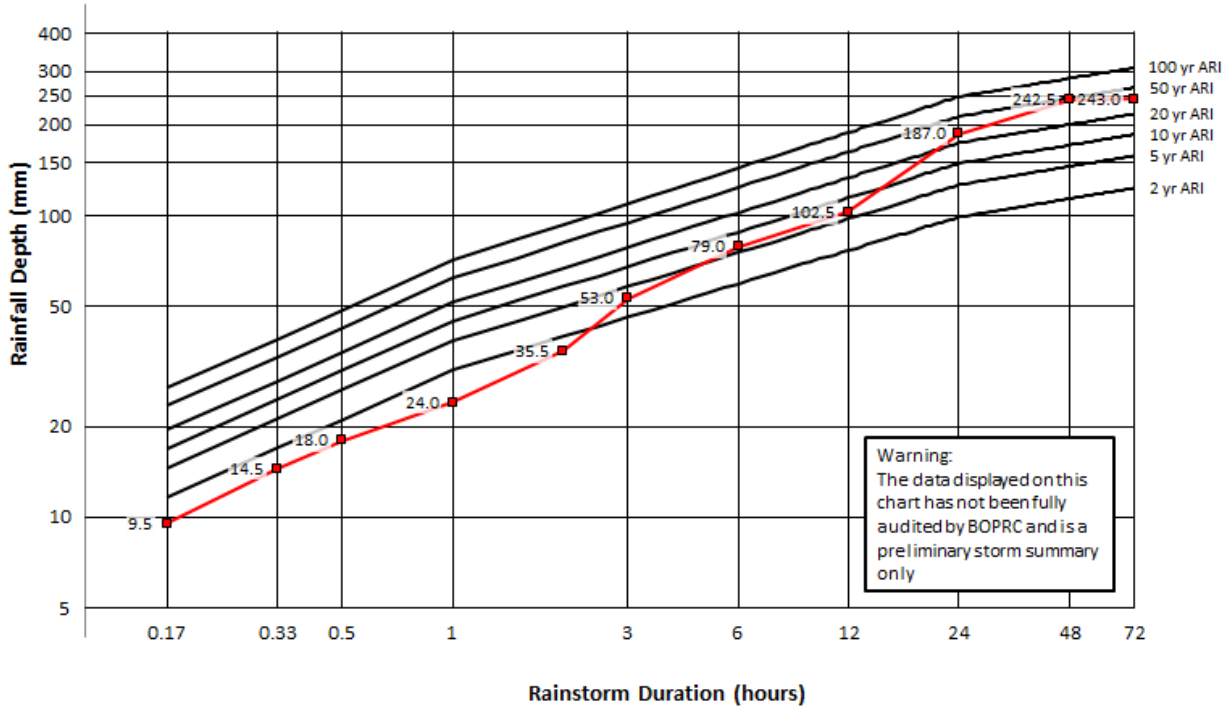
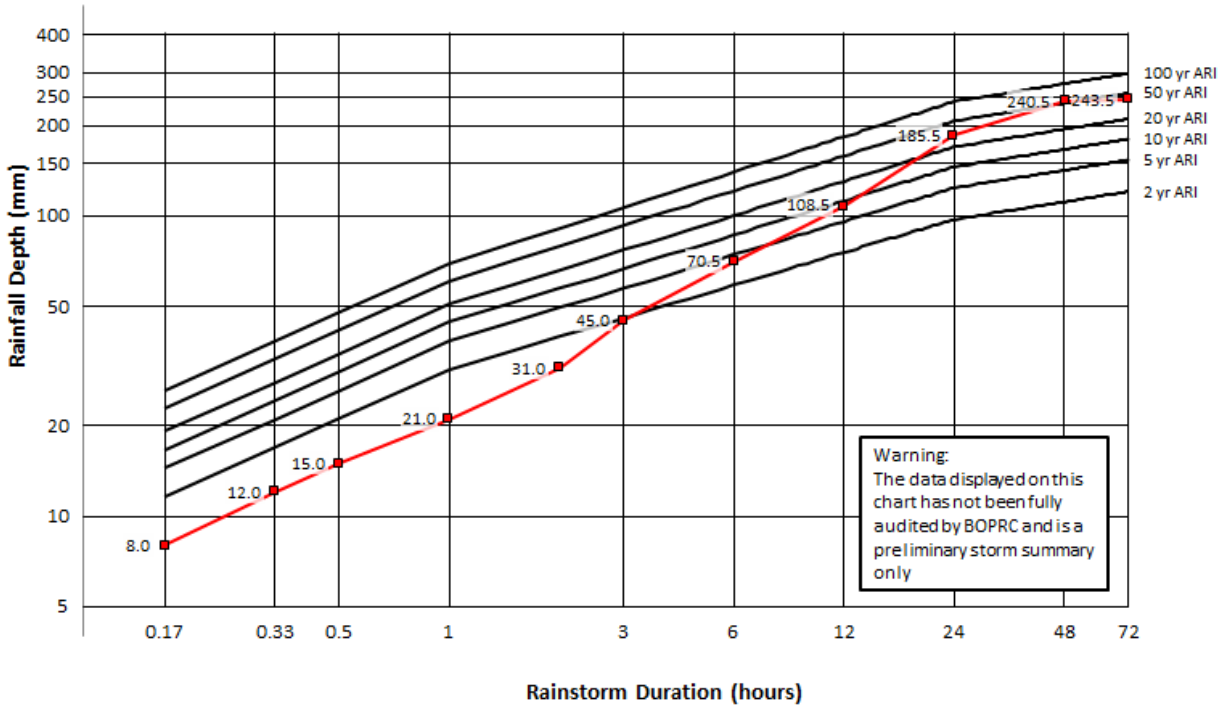

Rangitaiki at Thornton
Storm depth duration data from 3/04/17 to 6/04/17 (red points)
plotted over depth duration frequency data from HIRDS v3 (black lines)
Rainfall Depth (mm)
400
300
250
200
150
100
50
20
10
5
0.17
0.33
0.5
1
3
6
12
24
48
72
Rainstorm Duration (hours)
100 yr ARI
50 yr ARI
20 yr ARI
10 yr ARI
5 yr ARI
2 yr ARI
8.0
12.5
18.0
28.0
48.0
56.5
68.5
84.0
157.5
210.0
212.0
Warning:
The data displayed on this chart has not been fully audited by BOPRC and is a preliminary storm summary only

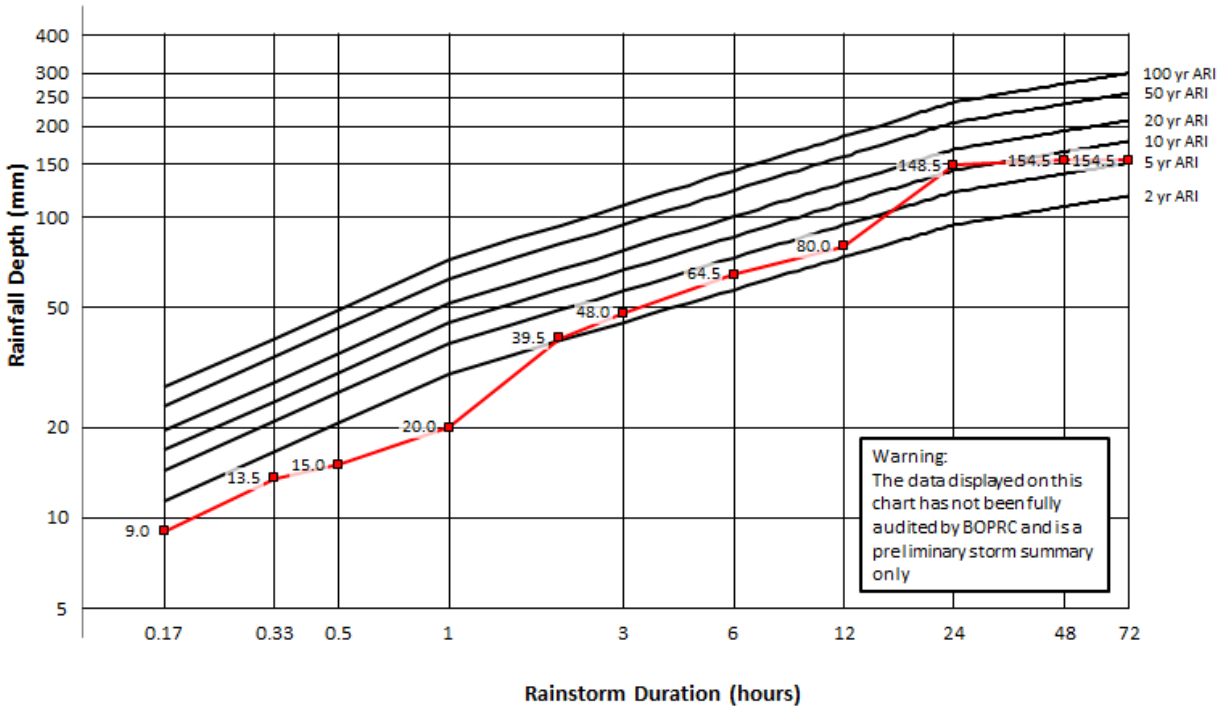
Rangitaiki Plains Climate at Flax Road
Storm depth duration data from 3/04/17 to 6/04/17 (red points)
plotted over depth duration frequency data from HIRDS v3 (black lines)



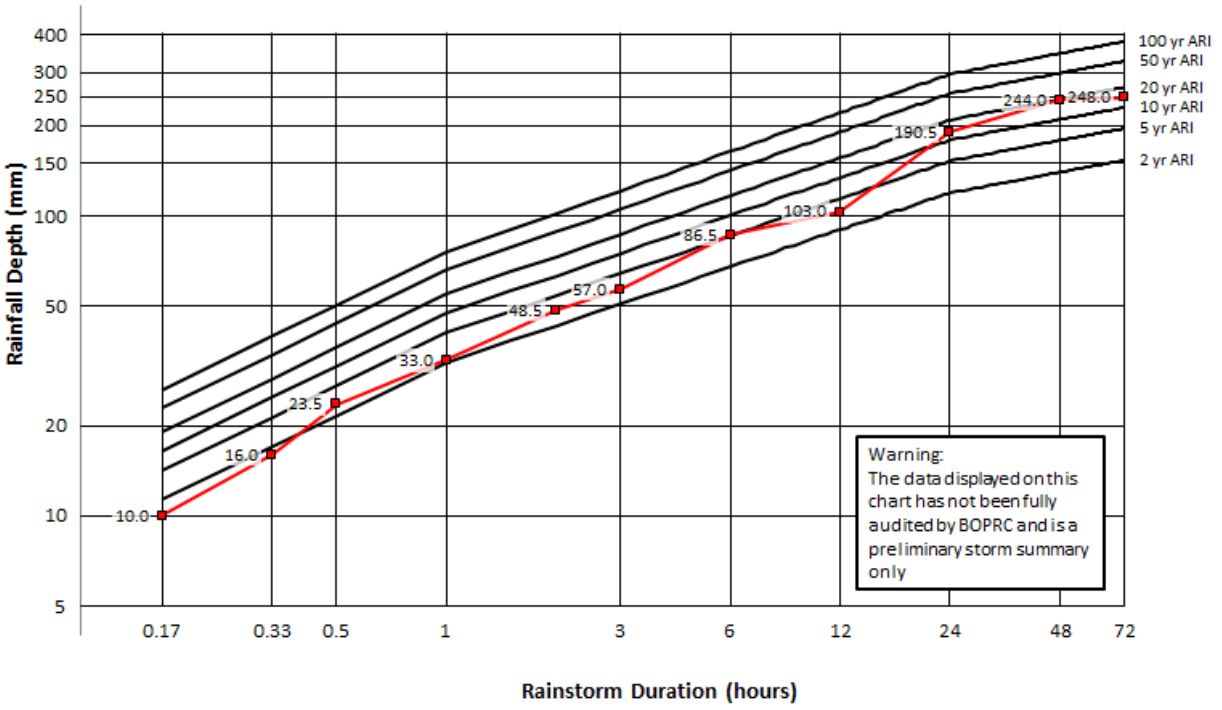
Tarawera at Awakaponga
Storm depth duration data from 3/04/17 to 6/04/17 (red points)
plotted over depth duration frequency data from HIRDS v3 (black lines)



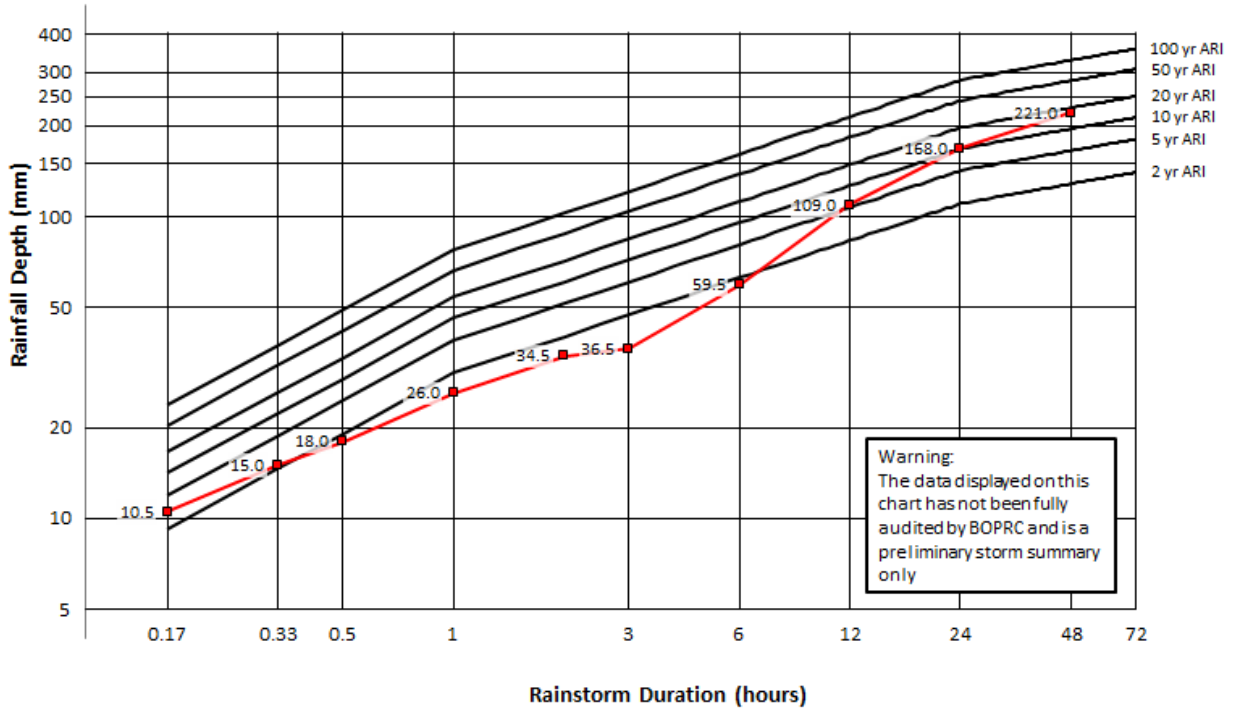
ORC at Pump Station
Storm depth duration data from 3/04/17 to 6/04/17 (red points)
plotted over depth duration frequency data from HIRDS v3 (black lines)



Ohinekoao at Harris Saddle
Storm depth duration data from 3/04/17 to 6/04/17 (red points)
plotted over depth duration frequency data from HIRDS v3 (black lines)

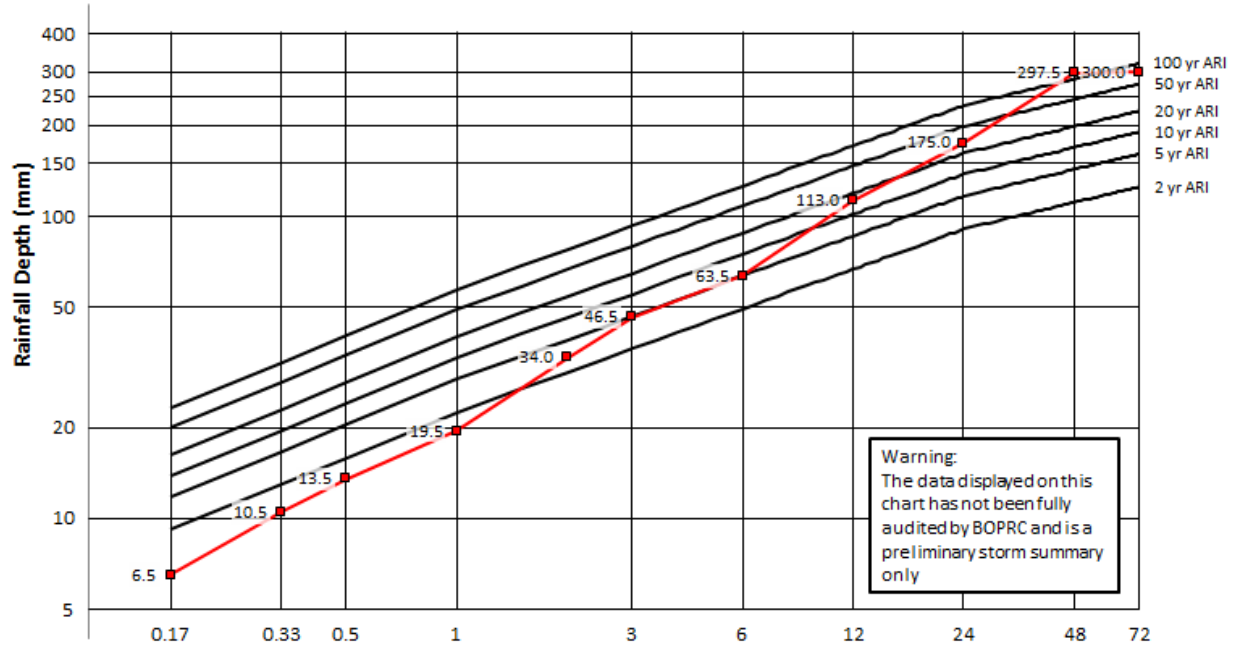


Pongakawa Rain at Pongakawa
Storm depth duration data from 3/04/17 to 6/04/17 (red points)
plotted over depth duration frequency data from HIRDS v3 (black lines)



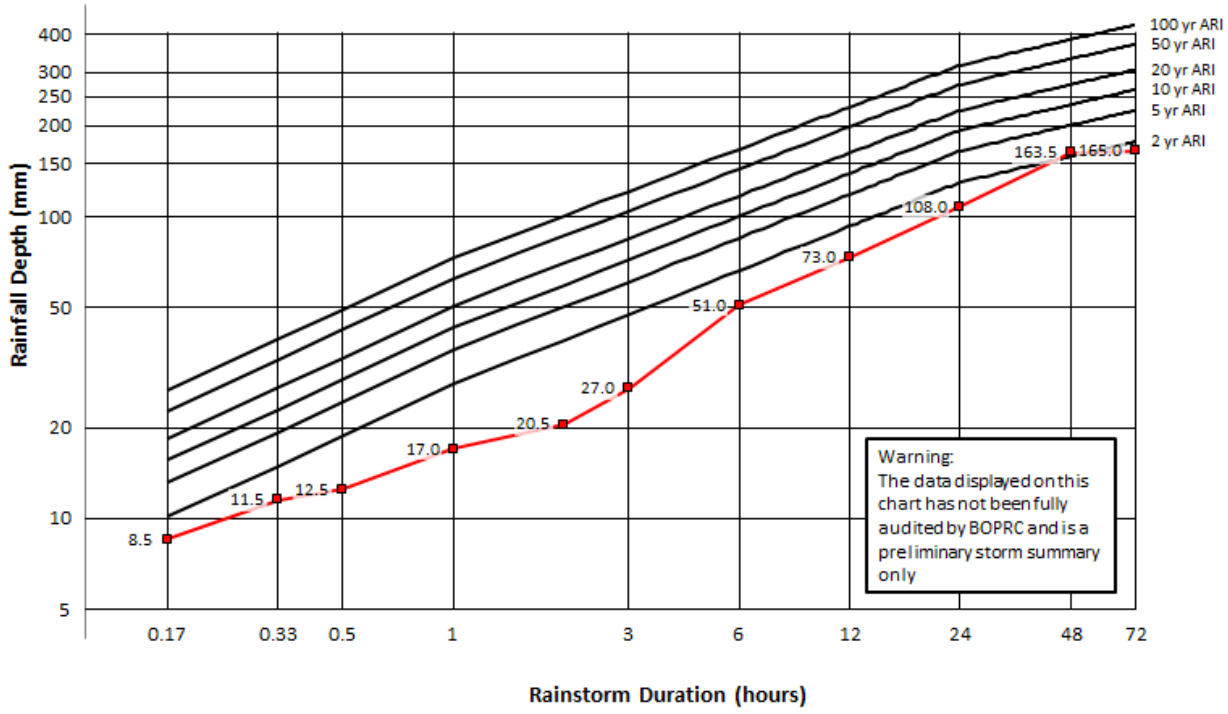
Rainstorm Duration (hours)

Okaro Meteorology at Birchalls
Storm depth duration data from 3/04/17 to 6/04/17 (red points)
plotted over depth duration frequency data from HIRDS v3 (black lines)

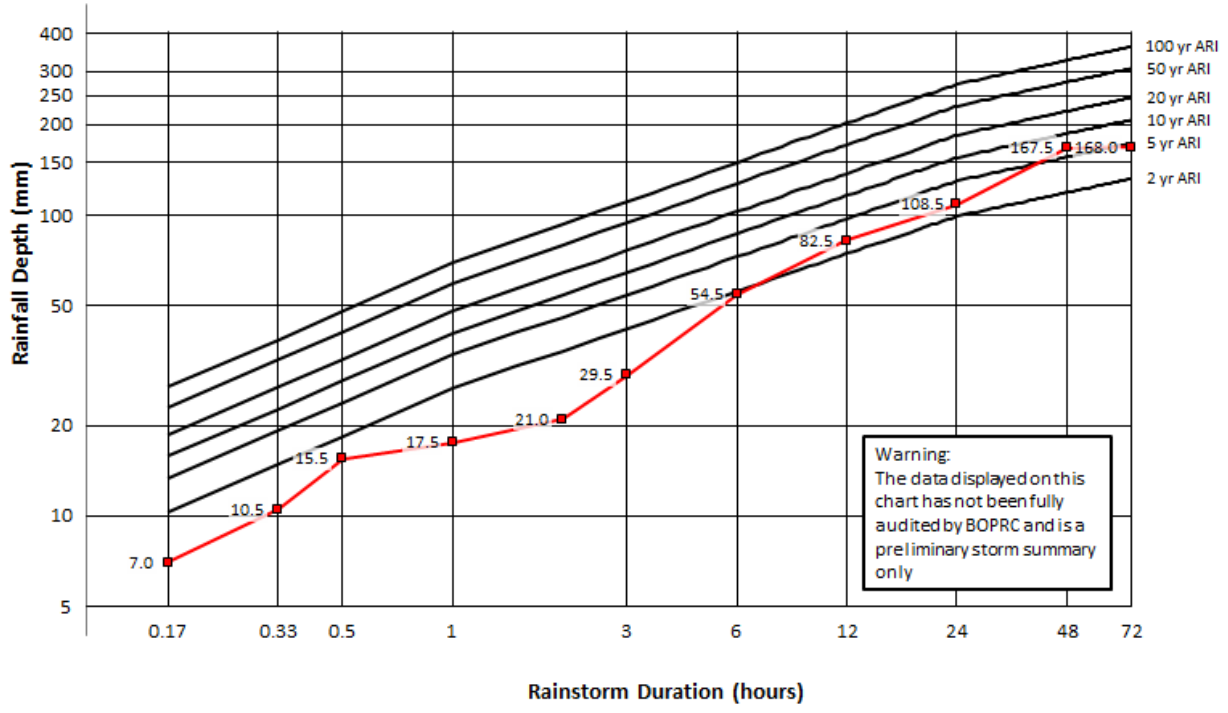


Rainstorm Duration (hours)

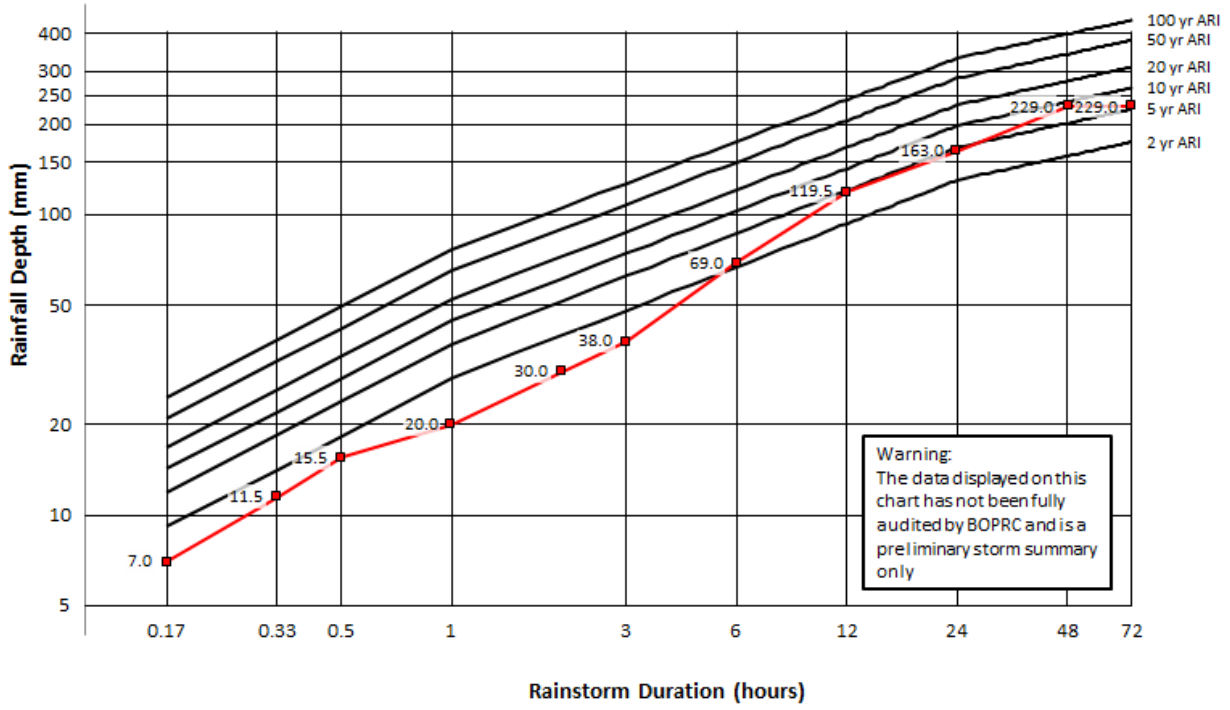
Rotorua at Upper Oturoa Rd
Storm depth duration data from 3/04/17 to 6/04/17 (red points)
plotted over depth duration frequency data from HIRDS v3 (black lines)



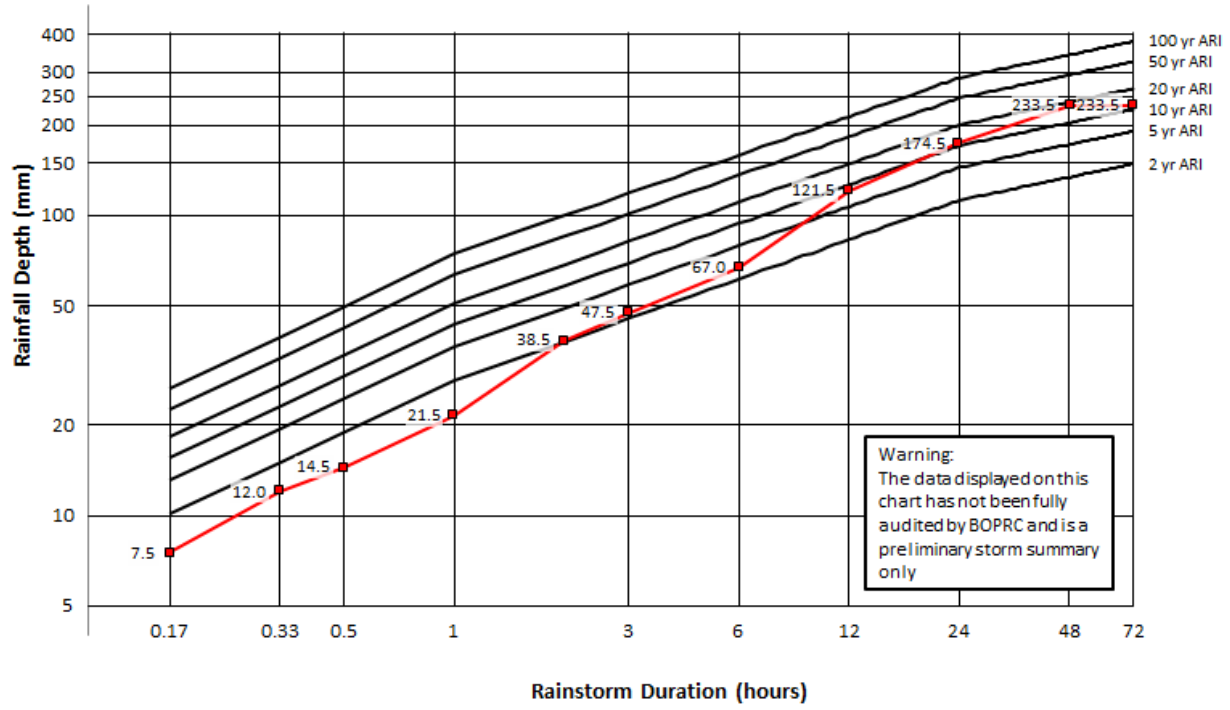
Kaituna at Whakarewarewa
Storm depth duration data from 3/04/17 to 6/04/17 (red points)
plotted over depth duration frequency data from HIRDS v3 (black lines)

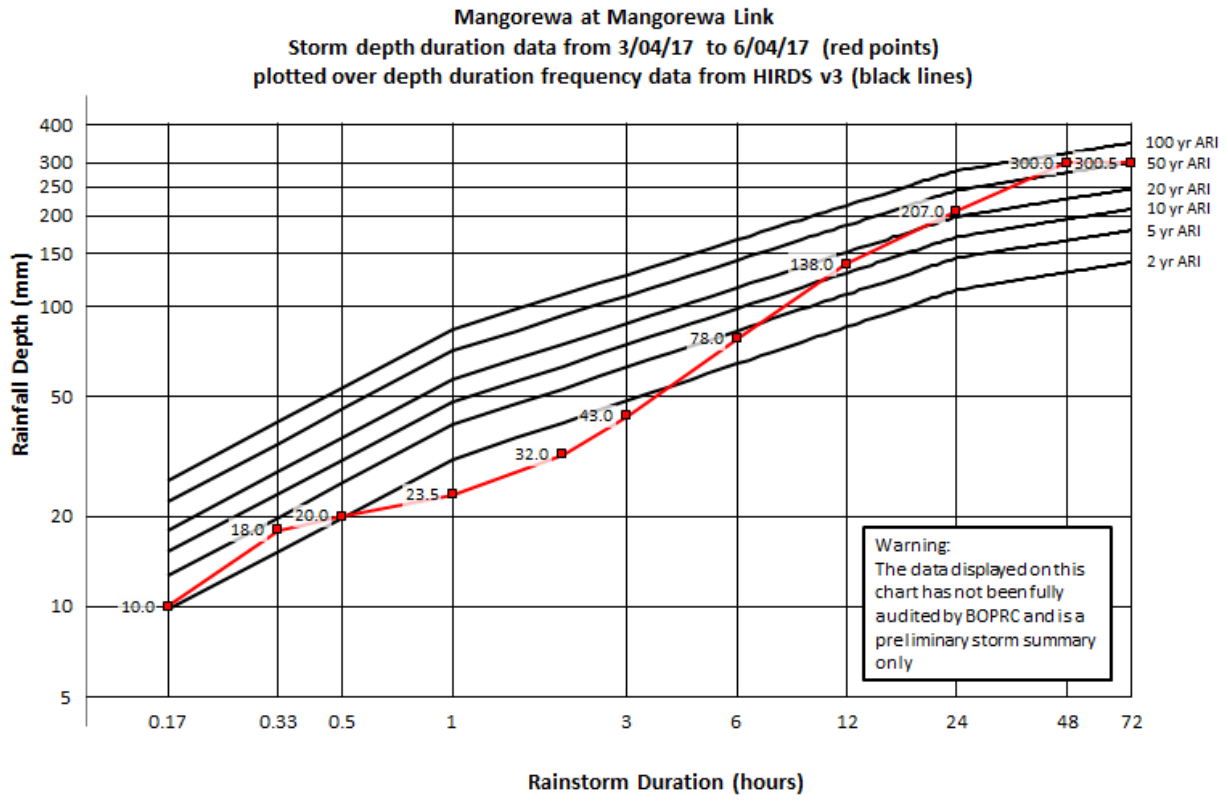


Mangorewa at Kaharoa
Storm depth duration data from 3/04/17 to 6/04/17 (red points)
plotted over depth duration frequency data from HIRDS v3 (black lines)



Lake Rotoiti at Okawa Bay
Storm depth duration data from 3/04/17 to 6/04/17 (red points)
plotted over depth duration frequency data from HIRDS v3 (black lines)




Mangorewa at Mangorewa Link
Storm depth duration data from 3/04/17 to 6/04/17 (red points)
plotted over depth duration frequency data from HIRDS v3 (black lines)
Rainfall Depth (mm)
400
300
250
200
150
100
50
20
10
5
0.17
0.33
0.5
1
3
6
12
24
48
72
Rainstorm Duration (hours)
100 yr ARI
50 yr ARI
20 yr ARI
10 yr ARI
5 yr ARI
2 yr ARI
10.0
18.0
20.0
23.5
32.0
43.0
78.0
138.0
207.0
300.0
300.5
Warning:
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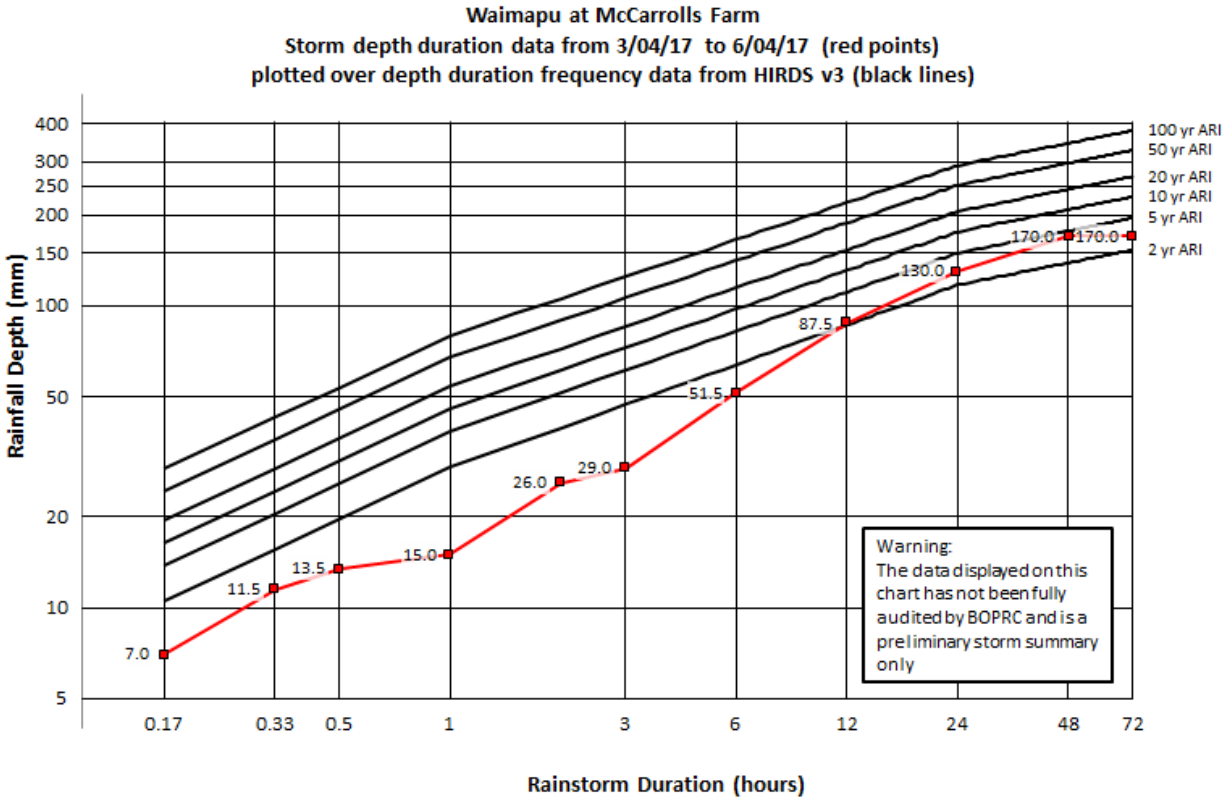
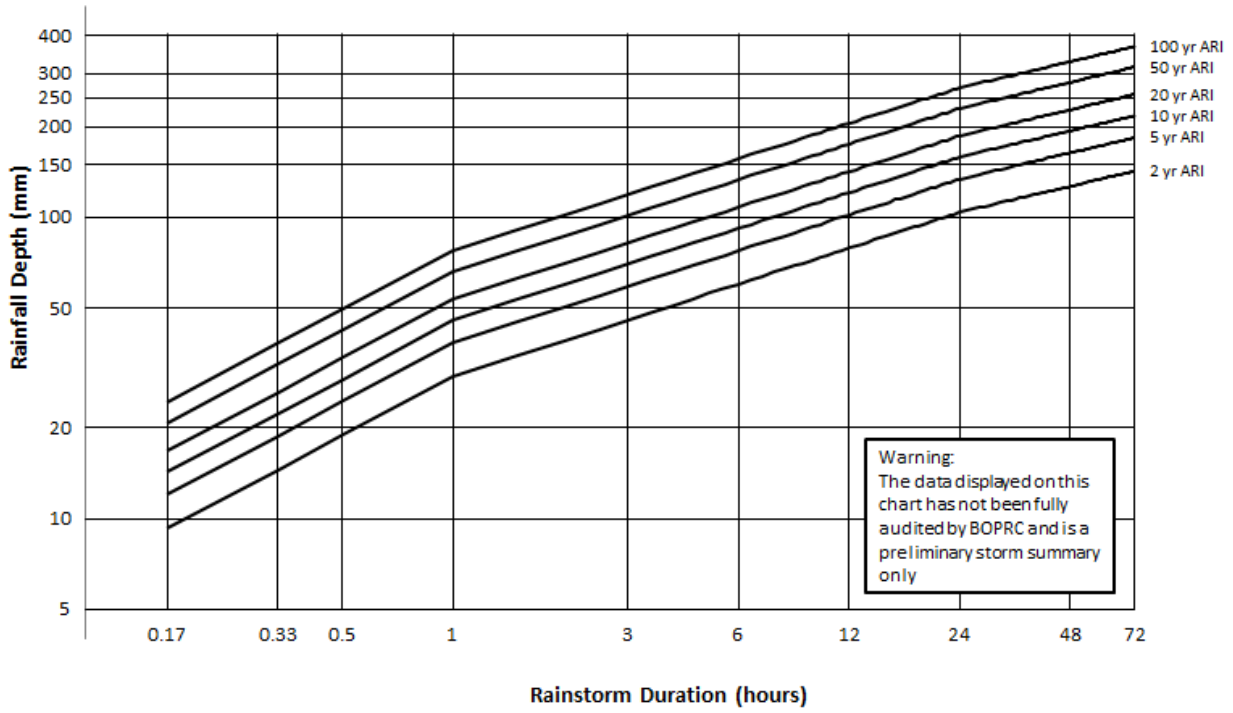
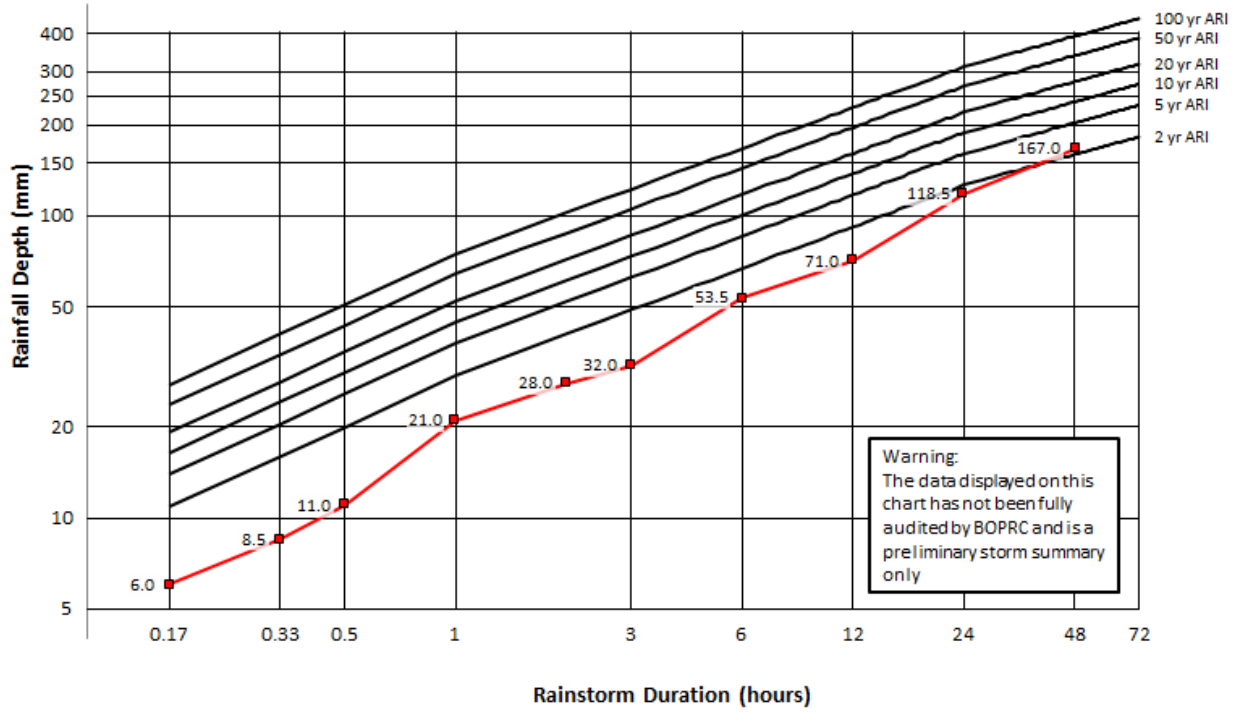
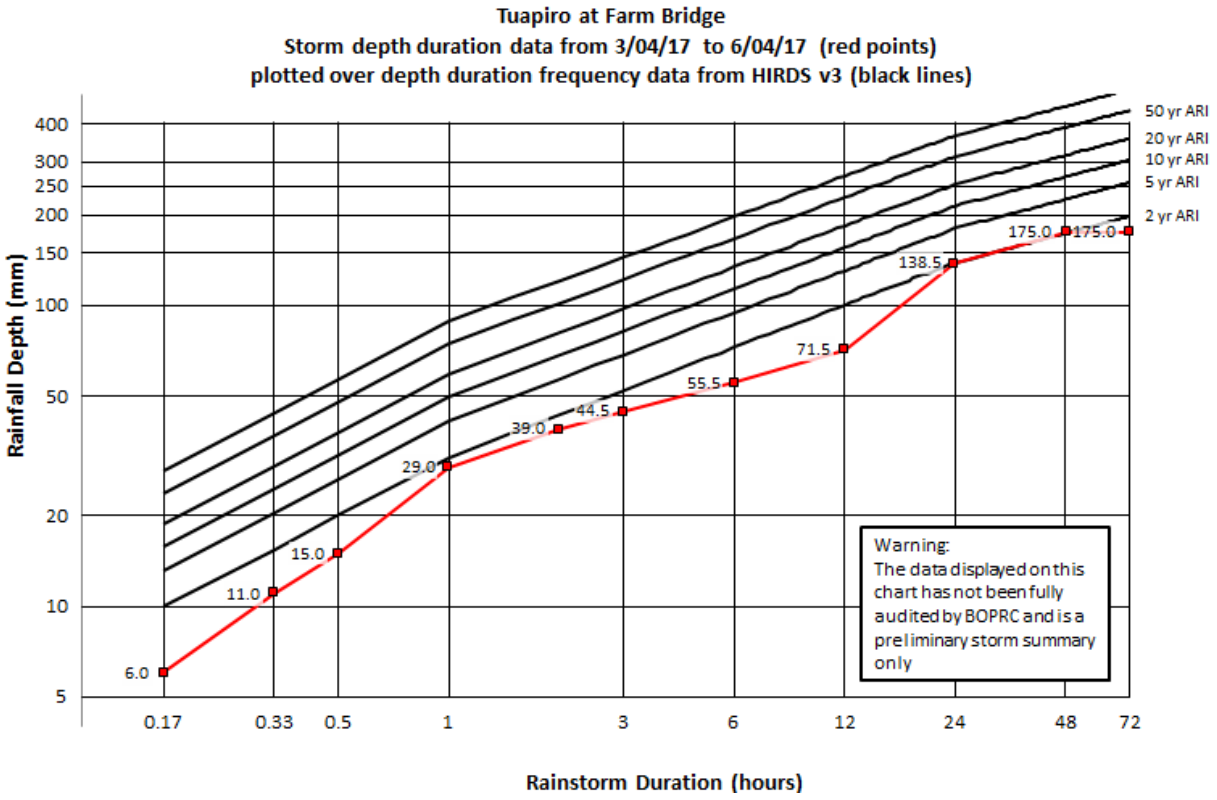

Waimapu at McCarrolls Farm
Storm depth duration data from 3/04/17 to 6/04/17 (red points)
plotted over depth duration frequency data from HIRDS v3 (black lines)
Rainfall Depth (mm)
400
300
250
200
150
100
50
20
10
5
0.17
0.33
0.5
1
3
6
12
24
48
72
Rainstorm Duration (hours)
100 yr ARI
50 yr ARI
20 yr ARI
10 yr ARI
5 yr ARI
2 yr ARI
7.0
11.5
13.5
15.0
26.0
29.0
51.5
87.5
130.0
170.0
170.0
Warning:
The data displayed on this chart has not been fully audited by BOPRC and is a preliminary storm summary only

Tauranga Harbour at Omokoroa
Storm depth duration data from 3/04/17 to 6/04/17 (red points)
plotted over depth duration frequency data from HIRDS v3 (black lines)



Waipapa at Goodalls Rd
Storm depth duration data from 3/04/17 to 6/04/17 (red points)
plotted over depth duration frequency data from HIRDS v3 (black lines)




Tuapiro at Farm Bridge
Storm depth duration data from 3/04/17 to 6/04/17 (red points)
plotted over depth duration frequency data from HIRDS v3 (black lines)
Rainfall Depth (mm)
400
300
250
200
150
100
50
20
10
5
0.17
0.33
0.5
1
3
6
12
24
48
72
Rainstorm Duration (hours)
50 yr ARI
20 yr ARI
10 yr ARI
5 yr ARI
2 yr ARI
6.0
11.0
15.0
29.0
39.0
44.5
55.5
71.5
138.5
175.0
175.0
Warning:
The data displayed on this chart has not been fully audited by BOPRC and is a preliminary storm summary only