

BEFORE THE HUTT CITY COUNCIL

Proposed District Plan Hearings Panel – Stream 5 – Natural Hazards

IN THE MATTER of the Resource Management Act 1991

AND

IN THE MATTER of the Proposed Lower Hutt District Plan

FLOOD EVENT LEVELS

MEMORANDUM OF

Alistair Osborne

Principal Stormwater Modeller, Tiaki Wai

25 September 2026

1.0 Flood Event Levels

- 1.1 The panel, in Minute #14, sought¹ that I provide the approximate return intervals for flood events that have occurred within Hutt City over the past decade.
- 1.2 To this end, Tiaki Wai engaged SLR Consulting New Zealand Limited to undertake an analysis of the 10 largest rainfall events recorded at various rainfall gauges across the Hutt Valley and adjacent catchments.
- 1.3 The full report is provided in Appendix 1 to this memorandum, and a summary of the information is provided below.
- 1.4 The events assessed as part of this investigation are as follows (in chronological order).
 - 1.4.1 14th of May, 2015.
 - 1.4.2 15th of November, 2016.
 - 1.4.3 8th of December, 2019.
 - 1.4.4 18th of September, 2020.
 - 1.4.5 6th of December to the 7th of December, 2021.
 - 1.4.6 26th of August, 2024.
 - 1.4.7 8th of April, 2025.
 - 1.4.8 2nd of December, 2025.
 - 1.4.9 15th of February to the 17th of February, 2026.
 - 1.4.10 18th of April to the 22nd of April, 2026.
- 1.5 For each event, the recorded rainfall at available rain gauges has been assessed to calculate the maximum return interval (1 in X-

¹ Minute 14, para 44.

year) for 4 different durations; 30 minutes, 1 hour, 6 hours, and 12 hours.

- 1.6 Two tables are provided in Appendix 2 which set out the maximum return interval (1 in X-year) and corresponding AEP (%) recorded during each event, at each rain gauge, irrespective of duration. The locations of the rain gauges are shown in Appendix 3.
- 1.7 Please note, some rain gauges were not operating at the time of the event investigated so no return interval has been provided. Similarly, some events did not generate significant rainfall at some of the rain gauges and no return interval is provided.
- 1.8 Maps showing the return intervals at each rain gauge for each event are provided in Appendix 3. The maps show the rain gauge locations as red points, with the corresponding return interval displayed in yellow text. The maps are intended to provide an indication of how rainfall varied across the Hutt Valley during each event. If no text is displayed beside a rain gauge, it is because of the situations described in paragraph 1.7.

Alistair Osborne for Tiaki Wai on behalf of Hutt City Council

25 September 2026

APPENDIX 1: Rainfall Event Analysis – Hutt Valley



Rainfall Event Analysis

Hutt Valley

Tiaki Wai

Level4, 25 Victoria Street, Petone, Lower Hutt

Prepared by:

SLR Consulting New Zealand Limited

SLR Project No.: 820.030844.00001

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Revision Record

Revision	Date	Prepared By	Checked By	Authorised By
1.0	23 September 2026	Fraser Philip & Deborah Maxwell	Charlotte Lockyer	Charlotte Lockyer

Basis of Report

This report has been prepared by SLR Consulting New Zealand Limited (SLR) with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with Tiaki Wai (the Client). Information reported herein is based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid. SLR may have used artificial intelligence (AI) in the preparation of this document. Should SLR use AI, any information and analysis resulting therefrom will be reviewed for accuracy.

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Executive Summary

This report has been prepared for Tiaki Wai to identify the ten largest events across the lower Hutt Valley since 2015. Rainfall depths were analysed across a range of event durations and gauges to capture both short-duration, high-intensity storms and longer-duration events as well as those that were widespread or more localised.

The analysis has shown that:

- The largest events have occurred at shorter durations (30-minute and 1-hour). These have not exceeded a 1 in 80-year return period. These events occurred in May 2015, December 2019 and April 2026.
- Over longer durations, rainfall events have not exceeded 1 in 60-year (6-hour duration, April 2026 and December 2019) and 1 in 40-year (12-hour duration, December 2021 and December 2019) events.

This data is summarised in Table E.1, which presents the largest magnitude event across the four durations considered, as recorded at each of the analysed gauges.

Overall, the events that have been experienced in the Hutt Valley since 2015 have been less than the 1% annual exceedance probability (AEP) modelled design storm currently being considered for flood hazard decision making.

Table E.1. Largest 1 in X-year return period at each site for each duration

Site	30-min	1-hour	6-hours	12-hours
Hutt River at Birch Lane	40	80	10	10
Hutt River at Haywards Hill Reservoir	80	80	60	40
Hutt River at Mabey Road Depot	10	10	10	10
Hutt River at Regent Street	10	20	10	20
Hutt River at Shandon Golf Club	10	30	10	20
Korokoro Stream at Belmont Trig	10	20	20	40
Mangaroa River at Tasman Vaccine Ltd	10	20	10	20
Pinehaven Stream at Pinehaven Res.	20	30	20	10
Wainuiomata River at Wainui Reservoir	10	10	10	10
Waiwhetu Stream at Seaview WWTP	20	10	5	10



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1.0 Introduction

As part of the Hutt City Council's District Plan hearings, the commissioners requested Tiaki Wai to provide the dates and return periods of the ten largest rainfall events in the Hutt Valley (from Haywards and Stokes Valley south to Petone and Waiwhetu, including Wainuiomata) since 2015.

The following rainfall event analysis has relied on rainfall records from ten gauges and events from 2015 to 2026. Rainfall depths were analysed across a range of event durations and gauges to capture both short-duration, high-intensity storms and longer-duration events as well as those that were widespread or more localised.

2.0 Rainfall gauges

Rainfall data from Greater Wellington Regional Council's (GWRC) monitoring network across the Hutt Valley were obtained from their Hydrotel database. There are eight rainfall gauges within the Hutt Valley including Stokes Valley and Wainuiomata (Figure 1). Several of these gauges commenced recording after 2015, and the Hutt River at Mabey Road Depot record has a significant gap between 2003 and 2018 (Table 1).

Two additional gauges (Pinehaven Stream at Pinehaven Reservoir and Mangaroa River at Tasman Vaccine Limited) are located outside of the Hutt Valley. These gauges were reviewed to provide context for rainfall that may have fallen in the Stokes Valley catchment which is currently not gauged.

Table 1. Length and record completeness of the ten gauge within the Upper Hutt area.

Gauge name	Start Date - End Date	Record length (Years)	Completeness (%)
Hutt River at Birch Lane	25/07/2001 - Present	25.1	99.9
Hutt River at Haywards Hill Reservoir	14/06/2019 - Present	7.2	97.8
Hutt River at Mabey Road Depot	10/11/1995 - Present	30.8	49.3
Hutt River at Regent Street	20/04/2018 - Present	8.4	66.2
Hutt River at Shandon Golf Club	03/04/2000 - Present	26.4	99.5
Korokoro Stream at Belmont Trig	29/06/2017 - Present	9.2	99.9
Mangaroa River at Tasman Vaccine Ltd	03/05/1968 - Present	58.3	96.5
Pinehaven Stream at Pinehaven Res.	03/08/2010 - Present	16.1	100.0
Wainuiomata River at Wainui Reservoir	01/01/1980 - Present	46.7	98.3
Waiwhetu Stream at Seaview WWTP	13/07/2018 - Present	8.2	100.0



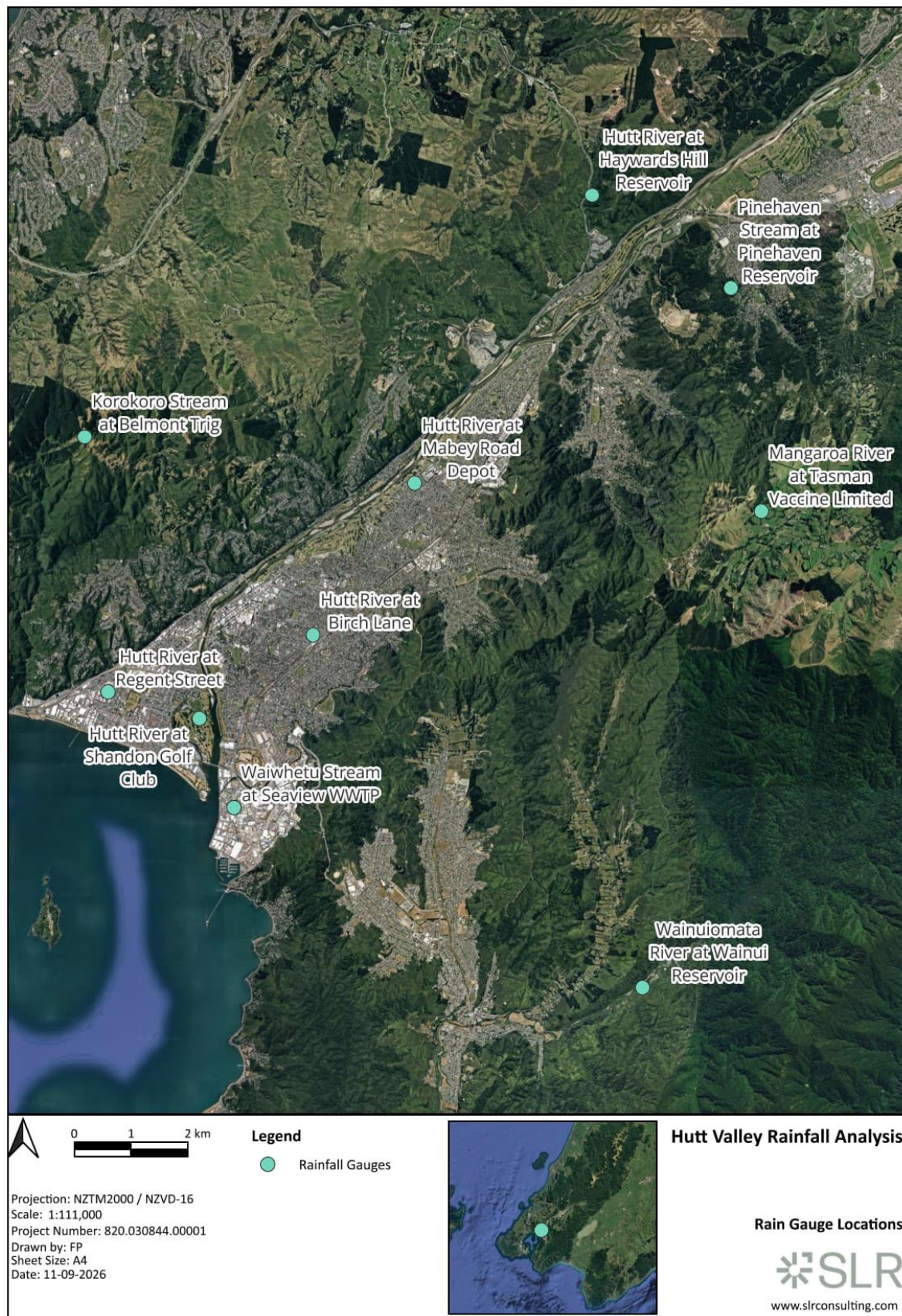


Figure 1. Rainfall gauges across the Hutt Valley area.



3.0 Event selection

For each of the ten gauges obtained from GWRC, the 20 largest rainfall depths were identified across the four durations being assessed (30-minute, 1-hour, 6-hours and 12-hours). At the shorter durations, some of these maxima are not independent events as a single storm may contain multiple high-intensity rainfall bursts that occur over several hours or days. Only the largest of these bursts are considered in this analysis.

The rarity of each rainfall event was assessed by comparing the recorded rainfall depths against estimates from the High Intensity Rainfall Design System HIRDS¹. HIRDS provides estimates of design rainfall depths for given storm durations and recurrence intervals across New Zealand. It is based on rainfall events up until the end of 2015 (Carey-Smith et. al., 2018). Although this means that significant rainfall events within the past 11 years are not included in the design rainfall estimations, HIRDS remains the most comprehensive and reliable source of design rainfall information available in the absence of long-term gauged rainfall data. The system incorporates regional climate patterns and topographic influences, allowing rainfall estimates to be derived across complex terrain and in areas with limited gauge coverage.

The use of HIRDS was particularly important for this assessment given the relatively short rainfall records available across much of the Hutt Valley. Of the ten rainfall gauges currently operating within or in the vicinity of the Hutt Valley, four commenced recording between 2017 and 2019, and a further gauge commenced in 2010. Although the Mabey Road Depot gauge started recording in 1996, there is a significant gap in the record between 2003 and 2018. As a result, direct frequency analysis of the gauge records would be associated with considerable uncertainty for rarer events. A commonly accepted rule of thumb is that historical records should only be used to reliably estimate return periods up to approximately twice the length of the available record. For several gauges within the study area, this would limit reliable estimation to events with return periods of around 20-years or less.

Following assignment of return periods, the most significant rainfall events across the Hutt Valley were identified by reviewing the events with the highest recurrence intervals across all gauges and durations. These events were then cross-checked against reports of flooding, surface ponding and other significant rainfall-related impacts obtained from media reports and previous studies. From this review, ten major rainfall events were selected for further assessment. The selected events include both widespread storms affecting large parts of the Hutt Valley and more localised events that generated particularly high rainfall intensities at individual gauges. As rainfall impacts and event severity vary spatially across the catchment, a degree of professional judgement was applied in the final event selection.

4.0 Event description

The following sections describe the ten largest rainfall events to have occurred between 2015 and 2026. Rain radar outputs from the Moata platform (Mott MacDonald) are presented to visually represent the nature of the event. Rainfall hyetographs show hourly rainfall depths at each gauge over each event. If a record is not presented for a gauge, then that indicates that gauge was not operational at the time.

¹ High Intensity Rainfall Design System (HIRDS v4) from ESNZ (<https://niwa.co.nz/climate-and-weather/hirdsv4-usage>)



4.1 April 2026

The rainfall events in April 2026 developed out a large slow moving low-pressure system that moved up the country. Rainfall and surface flooding was widespread across the Hutt Valley (and Wellington) region, particularly around Stokes Valley (Figure 2).

Figure 4 presents hourly rainfall totals at each of the gauges during the event and Table 2 shows the maximum rainfall depths and corresponding return periods recorded at each gauge by duration. Rainfall depths are presented only for gauges where the event ranked among the 20 highest rainfall depths for that duration.

On the 18 April, the greatest rainfall depths occurred in the upper part of the Hutt Valley around Haywards and Stokes Valley (Pinehaven and Mangaroa rainfall gauges). The event was most significant over the shorter durations.

Haywards Reservoir recorded its largest 30-minute and 1-hour rainfall depths of 30 mm (1 in 80-year annual exceedance probability (AEP) event) and 91 mm (1 in 60-year AEP event), respectively, since records began in 2019. At 1-hour and 12-hour durations, the event was the second largest recorded with 42 mm (1 in 80-year AEP event) and 101 mm (1 in 20-year AEP event) recorded, respectively.

The event was less significant at other sites. At the Mangaroa gauge, 36mm fell within 1-hour corresponding to a 1 in 20-year AEP event. For all other durations, rainfall depths were no more than a 1 in 10-year AEP event.

Significant rainfall was also recorded at Pinehaven and Mabey Road gauges across all durations, however, at both sites the event was no larger than a 1 in 10-year AEP event.

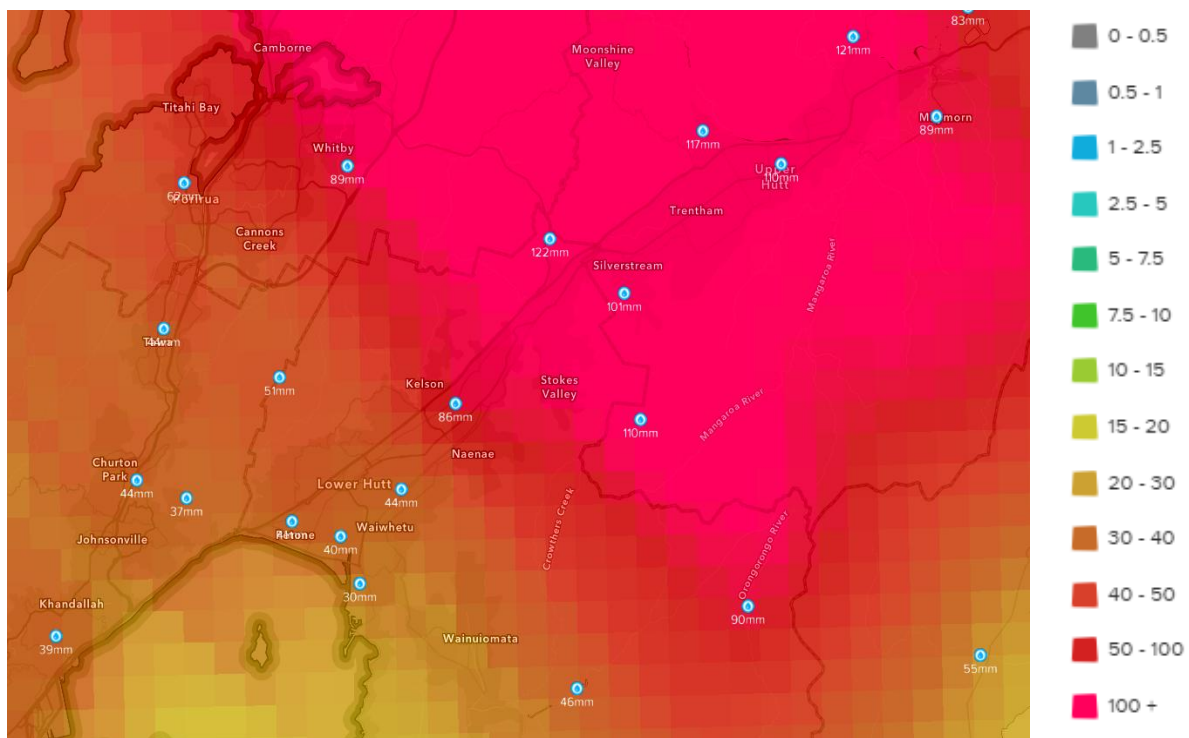


Figure 2. Cumulative rainfall depth (mm) across the greater Wellington Region between 12:00 AM 18 April 2026 and 12:00 AM 19 April 2026.
Source: Moata (Mott MacDonald).



Two days later, heavy rainfall was recorded in the eastern part of the Hutt Valley including Wainuiomata (Figure 3). Rising water levels prompted some residents to be evacuated.

The gauge at Wainui Reservoir recorded its seventh largest 12-hour rainfall depth of 120mm since 1986², equating to a 1 in 10-year AEP event. At shorter durations the rainfall was less significant, with the 1-hour and 6-hour durations estimated to be a 1 in 5-year AEP event.

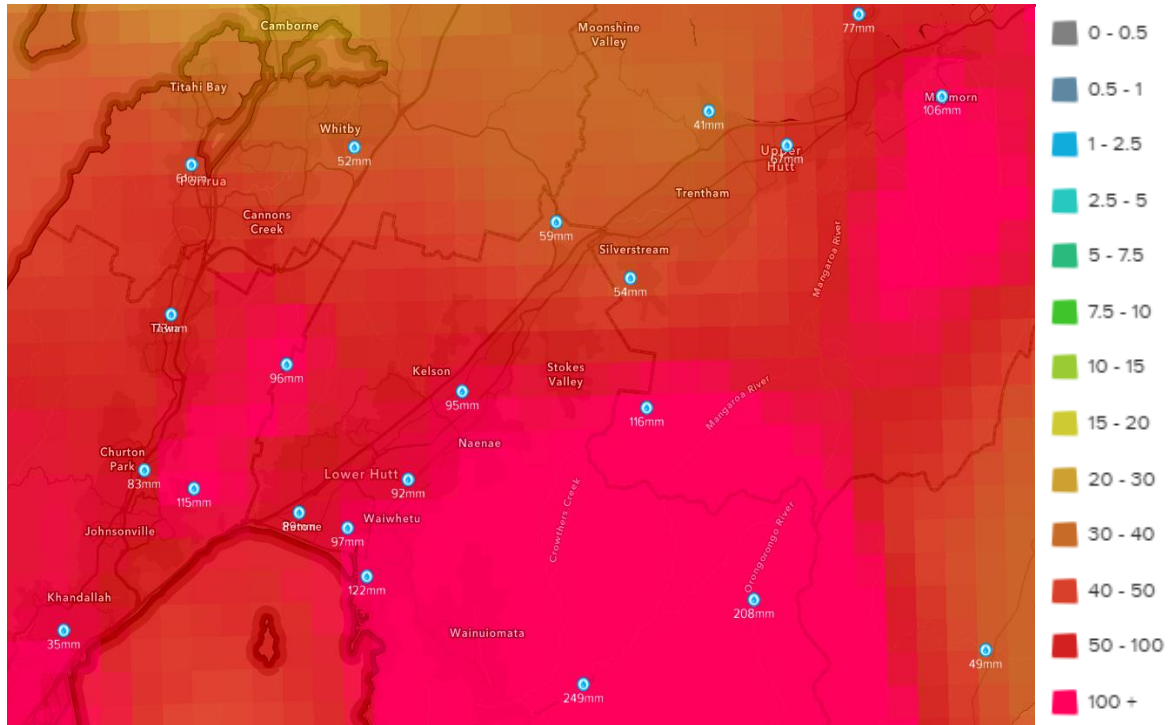


Figure 3. Cumulative rainfall depth (mm) across the greater Wellington Region between 12:00 AM 20 April 2026 and 12:00 PM 22 April 2026.
Source: Moata (Mott MacDonald).

² Although the record for Wainui Reservoir commenced in 1890, only daily rainfall depths were recorded until 1986. Therefore, sub-daily rainfall totals could not be discerned between 1890 and 1986.



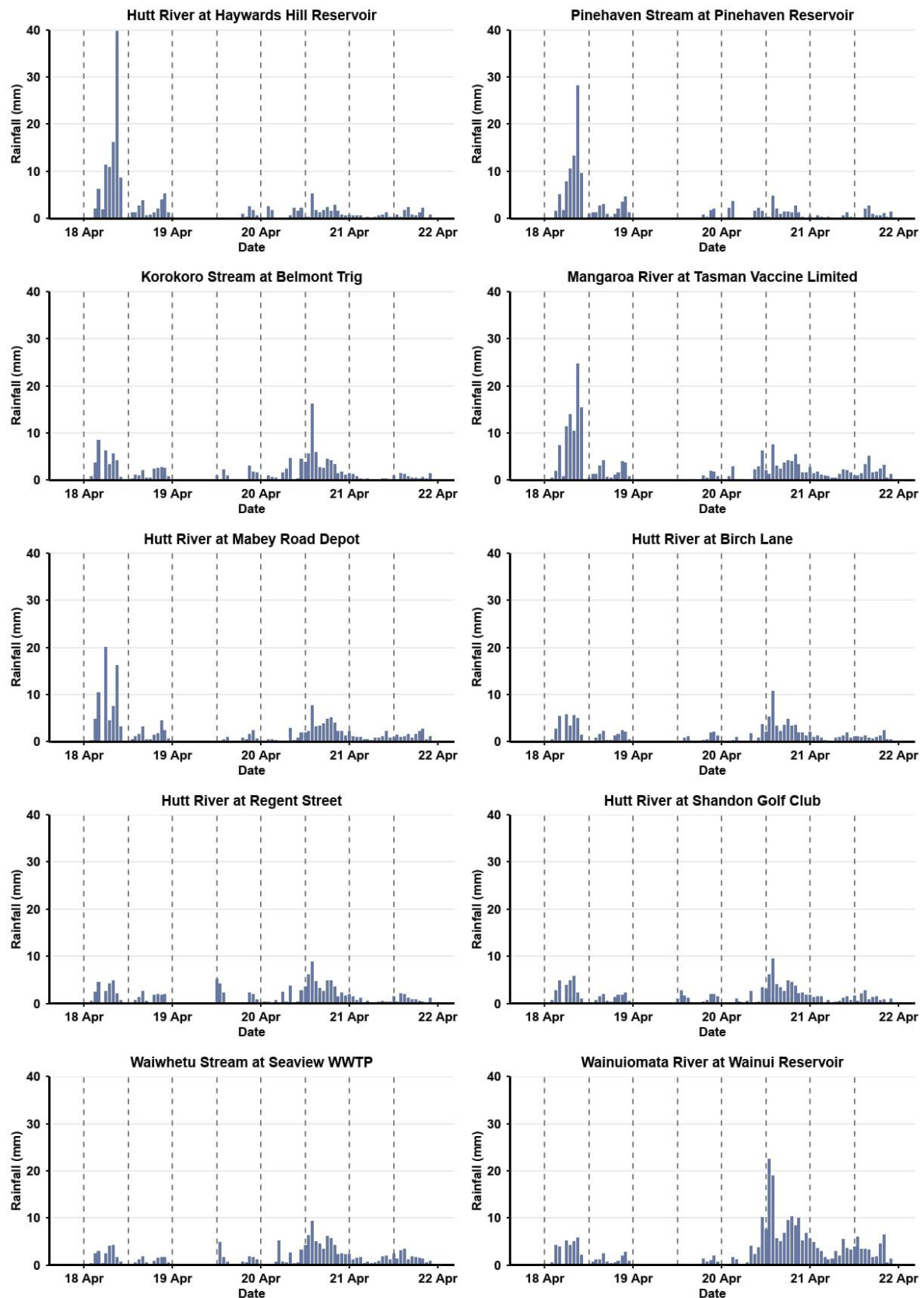


Figure 4. Hourly rainfall for each rainfall gauge 18-21 April 2026.



Table 2. Event maximum rainfall depths by duration and gauge. Results are presented only for gauges where the event ranked among the 20 highest rainfall depths for that duration.

Site	Max Rainfall (mm)	AEP (%)	1 in X AEP (yrs)
30 mins			
Hutt River at Haywards Hill Reservoir	30	1.3	80
Mangaroa River at Tasman Vaccine Limited	24	10	10
Pinehaven Stream at Pinehaven Reservoir	19	20	5
Hutt River at Mabey Road Depot	17	20	5
Wainuiomata River at Wainui Reservoir	14	50	2
1-hour			
Hutt River at Haywards Hill Reservoir	42	1.3	80
Mangaroa River at Tasman Vaccine Limited	36	5	20
Pinehaven Stream at Pinehaven Reservoir	28	10	10
Wainuiomata River at Wainui Reservoir	23	20	5
Hutt River at Mabey Road Depot	21	50	2
Korokoro Stream at Belmont Trig	18	63	1.6
6-hours			
Hutt River at Haywards Hill Reservoir	91	1.7	60
Mangaroa River at Tasman Vaccine Limited	78	10	10
Pinehaven Stream at Pinehaven Reservoir	73	10	10
Hutt River at Mabey Road Depot	60	10	10
Wainuiomata River at Wainui Reservoir	70	20	5
Waiwhetu Stream at Seaview WWTP	35	63	1.6
12-hours			
Hutt River at Haywards Hill Reservoir	101	5	20
Wainuiomata River at Wainui Reservoir	120	10	10
Mangaroa River at Tasman Vaccine Limited	90	10	10
Pinehaven Stream at Pinehaven Reservoir	83	20	5
Hutt River at Mabey Road Depot	69	20	5
Waiwhetu Stream at Seaview WWTP	57	50	2
Korokoro Stream at Belmont Trig	56	50	2
Hutt River at Shandon Golf Club	50	63	1.6
Hutt River at Regent Street	49	63	1.6



4.2 February 2026

The 'Valentine's Storm' affected large parts of country. It brought significant rainfall to the Hutt Valley over 15-16 February 2026 (Figure 5).

Figure 6 presents hourly rainfall totals at each of the gauges during the event and Table 3 shows the maximum rainfall depths and corresponding return periods recorded at each gauge by duration. Rainfall depths are presented only for gauges where the event ranked among the 20 highest rainfall depths for that duration.

The event was most significant at Mangaroa with the 12-hour recorded maxima of 114 mm, the third largest depth since 1979³. This 12-hour rainfall depth is estimated to be a 1 in 20-year AEP event (5% AEP). Rainfall depths recorded at Wainui Reservoir, Pinehaven Reservoir and Mabey Road Depot were equivalent to 1 in 10-year AEP events. At all other gauges, the event was a 1 in 2-year AEP to 1 in 5-year AEP event.

The event was not very significant at shorter durations of 30-minutes and 1-hour (less than a 1 in 5-year AEP event) but was a 1 in 10-year AEP event at Wainui Reservoir over 6-hours.

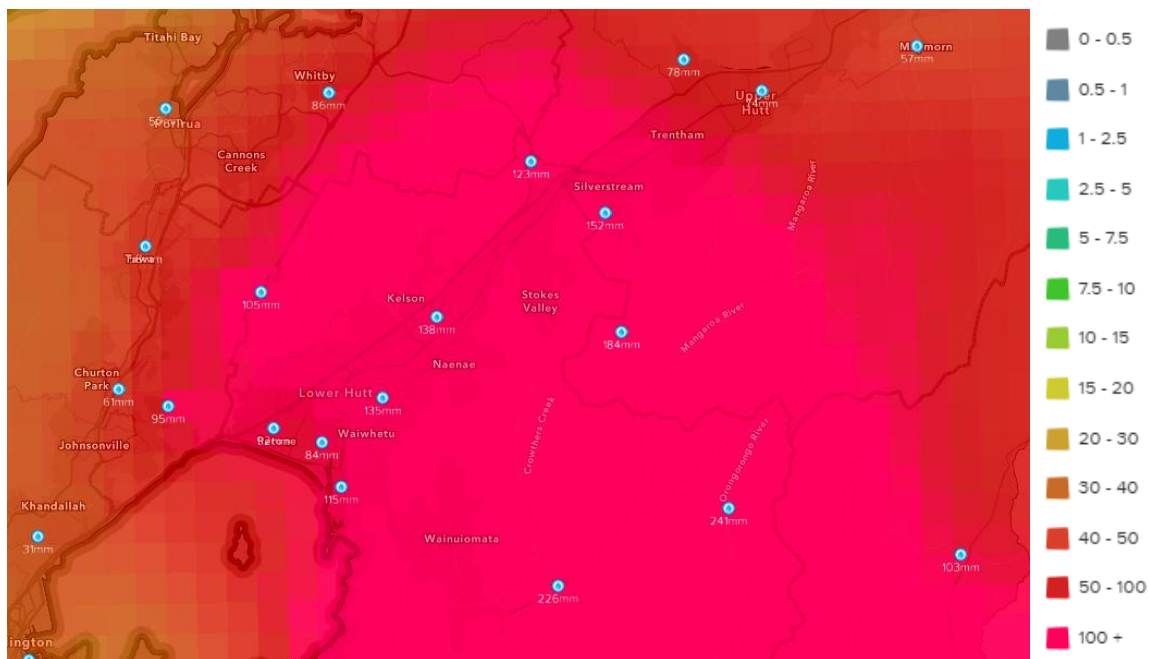


Figure 5. Cumulative rainfall depth (mm) across the greater Wellington Region between 12:00 PM 15 February 2026 and 12:00 PM 17 February 2026. Source: Moata (Mott MacDonald).

³ Although records began in 1968, only daily rainfall depths were recorded until 1979. Therefore, sub-daily rainfall totals could not be discerned between 1968 and 1979.



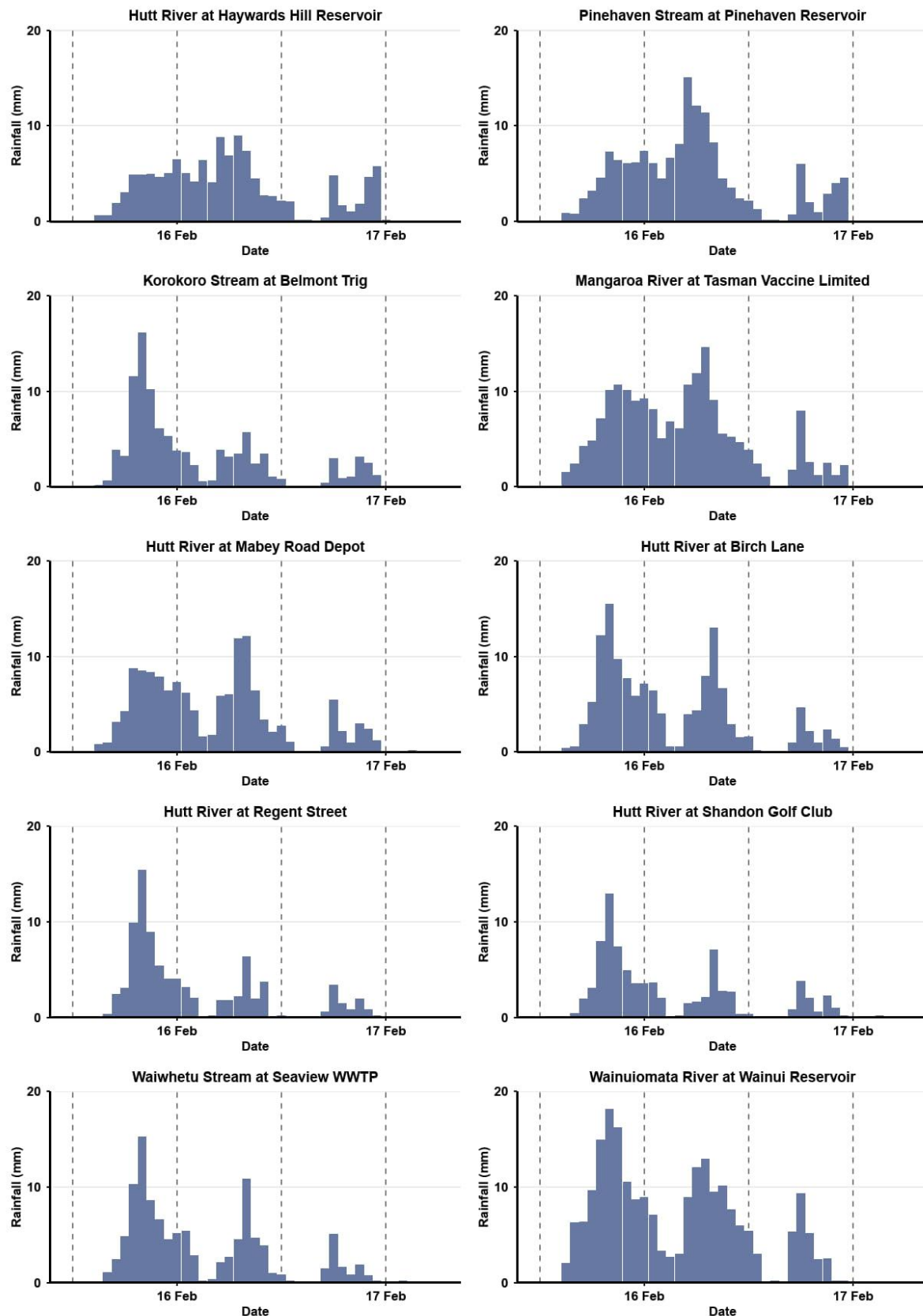


Figure 6. Hourly rainfall for each rainfall gauge 15-16 February 2026.



Table 3. Event maximum rainfall depths by duration and gauge. Results are presented only for gauges where the event ranked among the 20 highest rainfall depths for that duration.

Site	Max Rainfall (mm)	AEP (%)	1 in X AEP (yrs)
1-hour			
Wainuiomata River at Wainui Reservoir	19	50	2
Korokoro Stream at Belmont Trig	18	50	2
Waiwhetu Stream at Seaview WWTP	16	63	1.6
Hutt River at Birch Lane	16	63	1.6
6-hour			
Wainuiomata River at Wainui Reservoir	79	10	10
Hutt River at Regent Street	48	20	5
Waiwhetu Stream at Seaview WWTP	52	20	5
Korokoro Stream at Belmont Trig	54	20	5
Mangaroa River at Tasman Vaccine Limited	59	20	5
Pinehaven Stream at Pinehaven Reservoir	62	20	5
Hutt River at Birch Lane	59	20	5
Hutt River at Shandon Golf Club	41	50	2
Hutt River at Haywards Hill Reservoir	43	50	2
Hutt River at Mabey Road Depot	47	50	2
12-hours			
Mangaroa River at Tasman Vaccine Limited	114	5	20
Wainuiomata River at Wainui Reservoir	116	10	10
Pinehaven Stream at Pinehaven Reservoir	99	10	10
Hutt River at Mabey Road Depot	81	10	10
Waiwhetu Stream at Seaview WWTP	67	20	5
Korokoro Stream at Belmont Trig	67	20	5
Hutt River at Haywards Hill Reservoir	73	20	5
Hutt River at Birch Lane	79	20	5
Hutt River at Shandon Golf Club	51	50	2
Hutt River at Regent Street	59	50	2



4.3 May 2015

A strong moist northwest flow funnelled an area of heavy rainfall and north westerly winds from the Tasman Sea over the lower North Island between the Kāpiti Coast and Wellington. The front contained numerous bands of heavy rain and pockets of thunderstorms that initially hit the Kāpiti Coast before slowly moving south-east across Porirua, the Hutt Valley and Wellington⁴ (Figure 7).

Figure 8 presents hourly rainfall totals at each of the gauges during the event and Table 4 shows the maximum rainfall depths and corresponding return periods recorded at each gauge by duration. Rainfall depths are presented only for gauges where the event ranked among the 20 highest rainfall depths for that duration.

The largest rainfall depths were recorded in central and lower Hutt Valley (and further north in Upper Hutt). Only six gauges were in operation at the time. The event was most significant at the 1-hour duration, recording 33mm at Shandon Golf Club (1 in 30-year AEP event) and 42mm in Avalon at Birch Lane (1 in 80-year AEP event). This was the largest 1-hour depth on record at both sites.

It was also the largest 30-minute event recorded at Birch Lane (27mm, 1 in 40-year AEP event), and the largest 6-hour rainfall depth at Shandon Golf Club (65mm, 1 in 10-year AEP event).

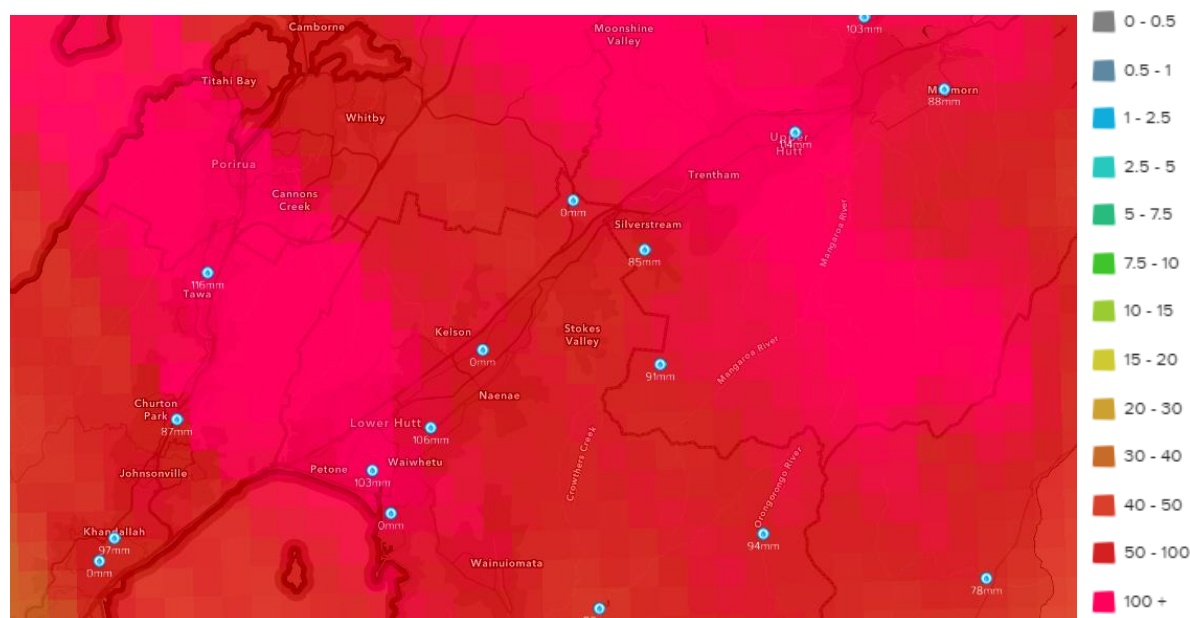


Figure 7. Cumulative rainfall depth (mm) across the greater Wellington Region between 12:00 AM 14 May 2015 and 12:00 PM 15 May 2015.
Source: Moata (Mott MacDonald).

⁴ <https://www.gw.govt.nz/your-region/news/yesterday-s-rainfall-by-the-numbers/>



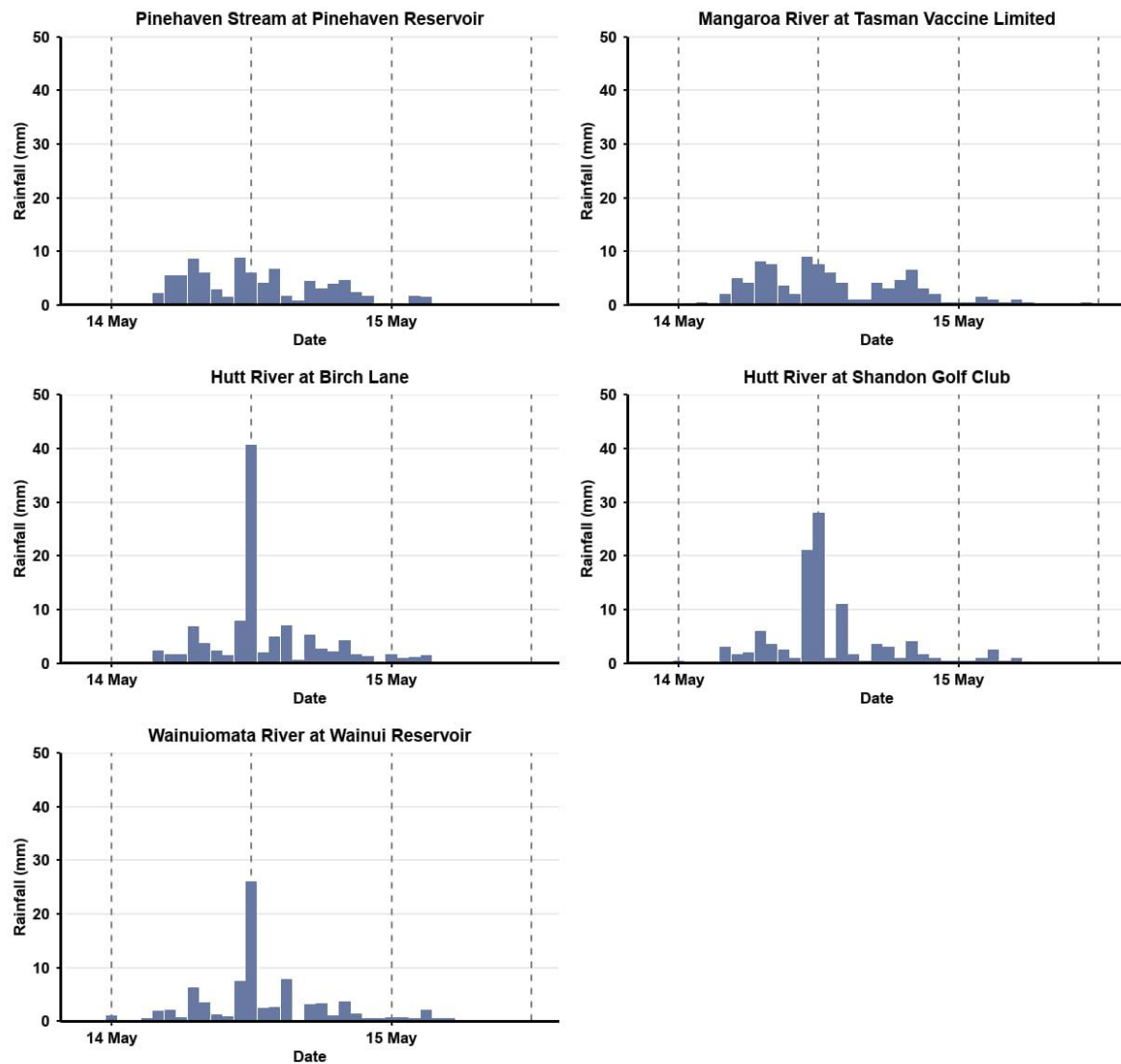


Figure 8. Hourly rainfall for each rainfall gauge 14-15 May 2015.



Table 4. Event maximum rainfall depths by duration and gauge. Results are presented only for gauges where the event ranked among the 20 highest rainfall depths for that duration.

Site	Max Rainfall (mm)	AEP (%)	1 in X AEP (yrs)
30 mins			
Hutt River at Birch Lane	27	2.5	40
Hutt River at Shandon Golf Club	18	20	5
Wainuiomata River at Wainui Reservoir	16	20	5
1-hour			
Hutt River at Birch Lane	42	1.3	80
Hutt River at Shandon Golf Club	33	3.3	30
Wainuiomata River at Wainui Reservoir	28	10	10
6-hours			
Hutt River at Shandon Golf Club	65	10	10
Hutt River at Birch Lane	65	10	10
Mangaroa River at Tasman Vaccine Limited	40	63	1.6
12-hours			
Hutt River at Shandon Golf Club	84	10	10
Hutt River at Birch Lane	87	10	10
Mangaroa River at Tasman Vaccine Limited	60	63	1.6
Pinehaven Stream at Pinehaven Reservoir	59	63	1.6



4.4 November 2016

Rainfall during the 14 to 15 November 2016 event was widespread across the Hutt Valley and caused widespread surface flooding. The rain radar indicates the greatest rainfall depths were recorded in the north of the catchment over the 15-hour window presented (Figure 9). However, significant rainfall in the south-eastern part of the catchment resulted in the Waiwhetu Stream rising above its banks in some places⁵.

Figure 10 presents hourly rainfall totals at each of the gauges during the event and Table 5 shows the maximum rainfall depths and corresponding return periods recorded at each gauge by duration. Rainfall depths are presented only for gauges where the event ranked among the 20 highest rainfall depths for that duration.

The Seaview WWTP rainfall gauge was not operational at the time, but the Shandon Golf Club recorded its third largest 6-hour rainfall depth (59 mm) which corresponded to a 1 in 10-year AEP event. Birch Lane and Pinehaven gauges recorded 1 in 5-year AEP events (55 mm and 64 mm, respectively). Pinehaven also recorded a 1 in 5-year AEP event over 12-hours (77 mm). At Mangaroa, rainfall accumulations for the 6-hour and 12-hours events were also significant (1 in 10-year).

The event was not significant at shorter durations (i.e., it did not exceed a 1 in 2-year AEP event at any gauge for 30-minute or 1-hour durations).

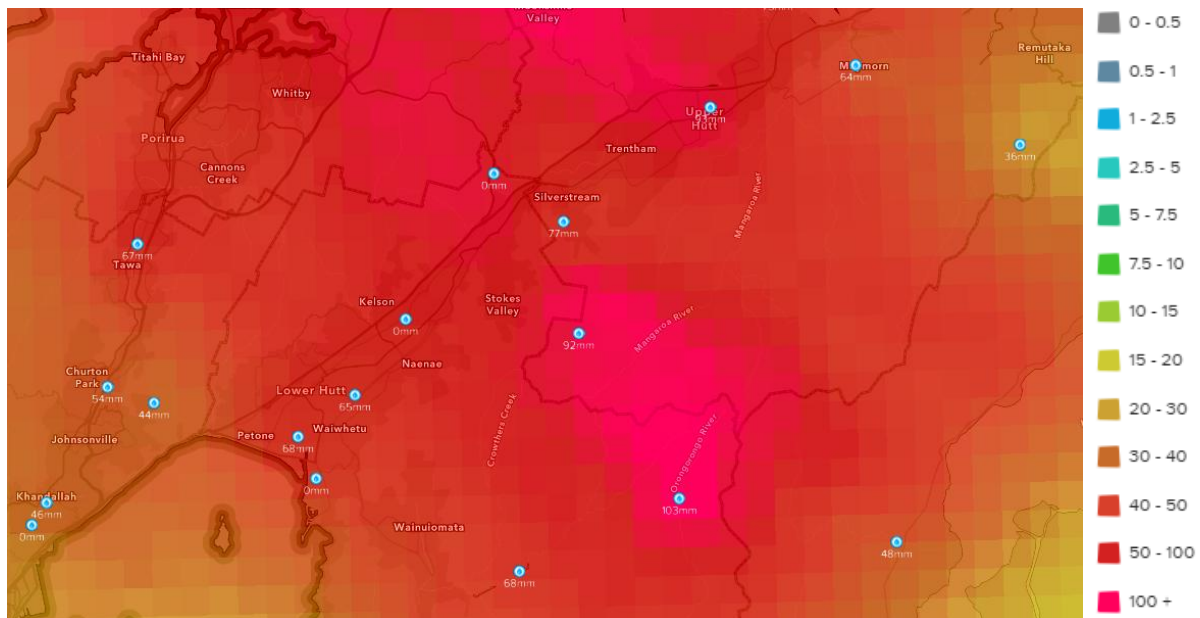


Figure 9. Cumulative rainfall depth (mm) across the greater Wellington Region between 12:00 AM 15 November 2016 and 03:00 PM 15 November 2016.
Source: Moata (Mott MacDonald).

⁵ https://www.rnz.co.nz/news/regions_marlborough/318094/rain-brings-commuter-chaos-to-capital-highways



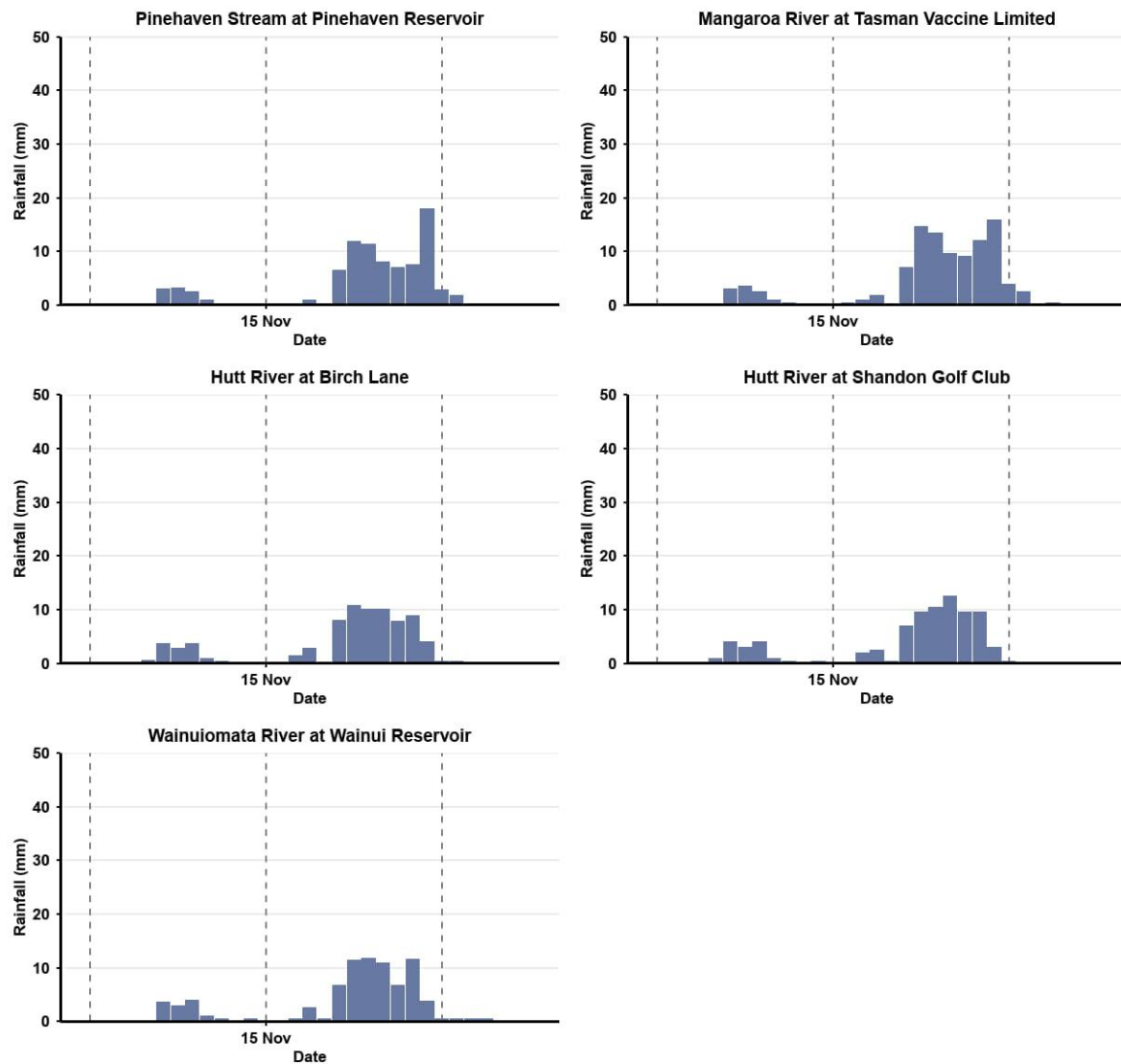


Figure 10. Hourly rainfall for each rainfall gauge 14-15 November 2016.



Table 5. Event maximum rainfall depths by duration and gauge. Results are presented only for gauges where the event ranked among the 20 highest rainfall depths for that duration.

Site	Max Rainfall (mm)	AEP (%)	1 in X AEP (yrs)
30 mins			
Pinehaven Stream at Pinehaven Reservoir	14	50	2
1-hour			
Hutt River at Shandon Golf Club	17	63	1.6
Pinehaven Stream at Pinehaven Reservoir	18	63	1.6
6-hours			
Hutt River at Shandon Golf Club	59	10	10
Mangaroa River at Tasman Vaccine Limited	75	10	10
Pinehaven Stream at Pinehaven Reservoir	64	20	5
Hutt River at Birch Lane	55	20	5
Wainuiomata River at Wainui Reservoir	59	50	2
12-hours			
Mangaroa River at Tasman Vaccine Limited	91	10	10
Hutt River at Shandon Golf Club	67	20	5
Pinehaven Stream at Pinehaven Reservoir	77	20	5
Hutt River at Birch Lane	65	50	2
Wainuiomata River at Wainui Reservoir	68	63	1.6



4.5 December 2019

YOn 8 December 2019, heavy rainfall was recorded in the northern part of the Hutt Valley (including Stokes Valley) and western hills (Figure 11).

Figure 12 presents hourly rainfall totals at each of the gauges during the event and Table 6 shows the maximum rainfall depths and corresponding return periods recorded at each gauge by duration. Rainfall depths are presented only for gauges where the event ranked among the 20 highest rainfall depths for that duration.

The largest depths were recorded at Haywards Reservoir across the four durations assessed, recording a 1 in 40-year AEP event for 30-minute (26 mm) and 12-hour (109 mm) durations, and up to a 1 in 60-year AEP event over 6-hours (90 mm). It was the largest 1-hour rainfall depth recorded at the gauge (42 mm) and equated to a 1 in 80-year AEP event.

Significant rainfall was also recorded at Pinehaven, with the largest 6-hour rainfall depth on record, which is equivalent to a 1 in 20-year AEP event at the gauge. The event was approximately a 1 in 10-year AEP event at Mangaroa across most durations indicating that Stokes Valley would have been impacted by this event.

The rainfall recorded at other gauges around the Hutt Valley suggest the event at these locations was less than a 1 in 5-year AEP event.

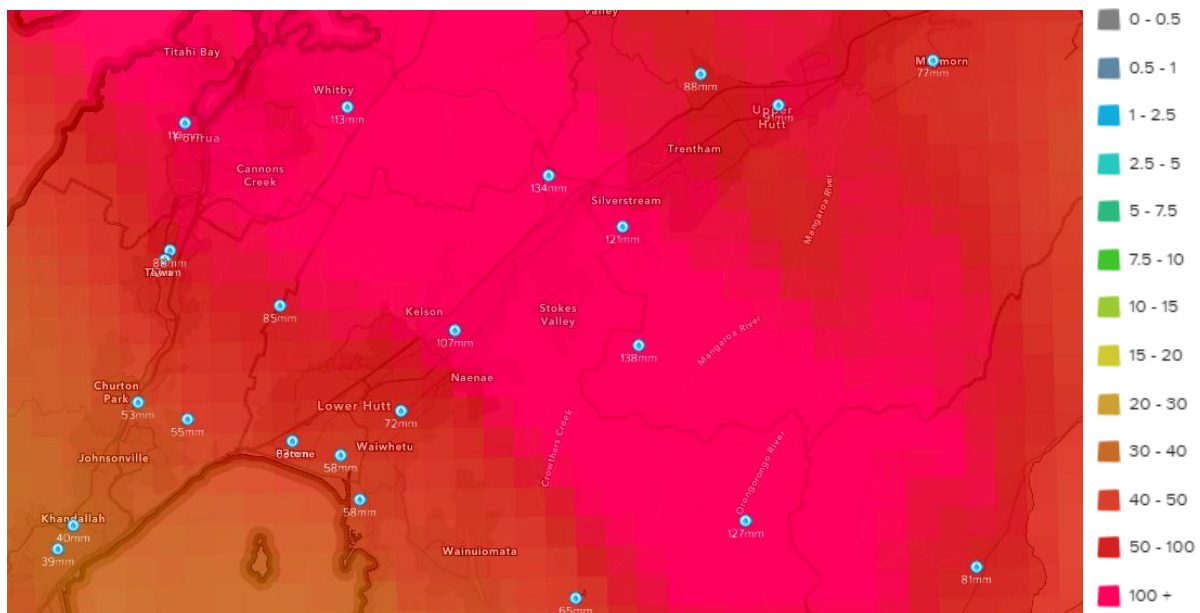


Figure 11. Cumulative rainfall depth (mm) across the greater Wellington Region between 12:00 PM 7 December 2019 and 18:00 AM 8 December 2019. Source: Moata (Mott MacDonald).



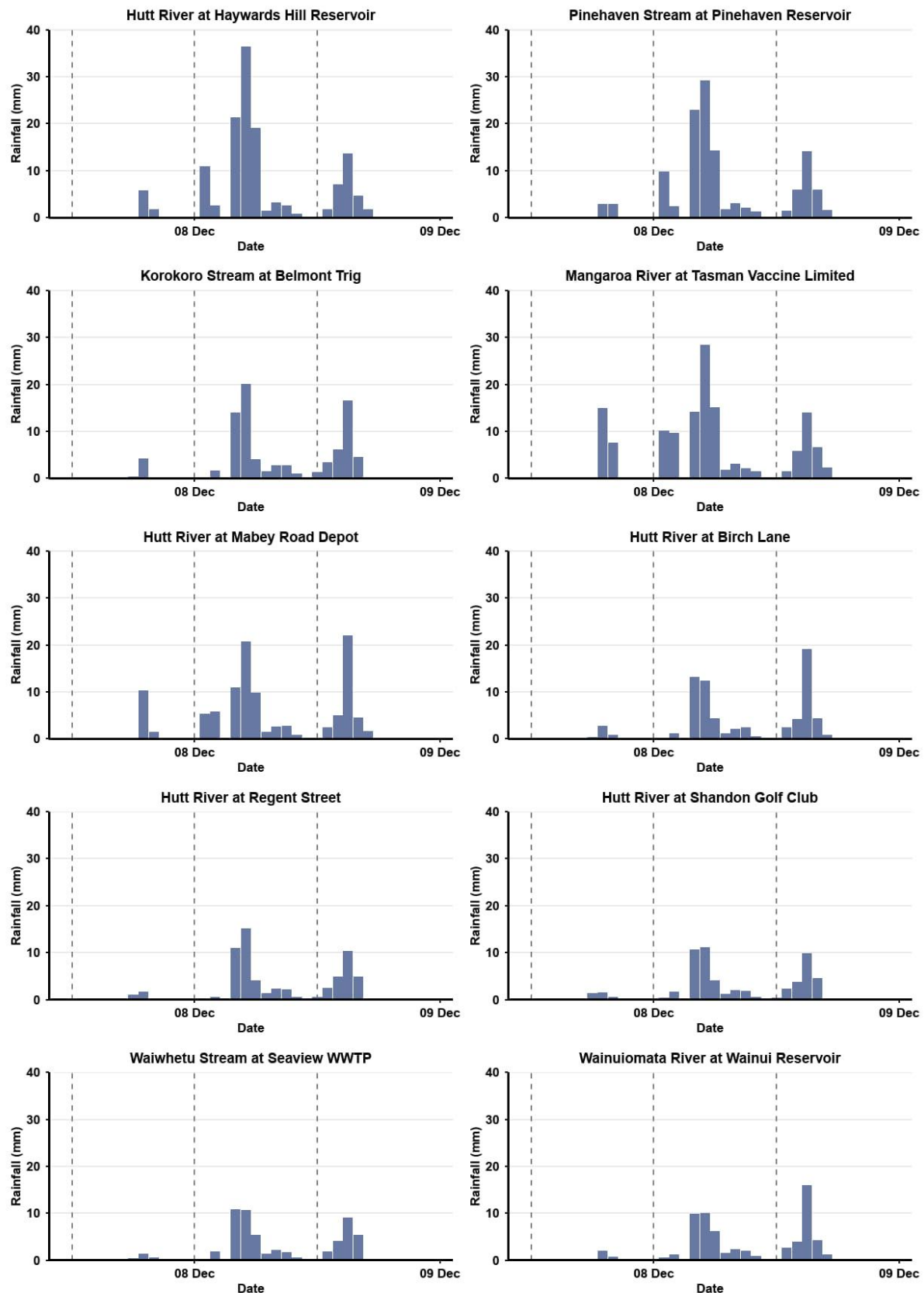


Figure 12. Hourly rainfall for each rainfall gauge 7-8 December 2019.



Table 6. Event maximum rainfall depths by duration and gauge. Results are presented only for gauges where the event ranked among the 20 highest rainfall depths for that duration.

Site	Max Rainfall (mm)	AEP (%)	1 in X AEP (yrs)
30 mins			
Hutt River at Haywards Hill Reservoir	26	2.5	40
Pinehaven Stream at Pinehaven Reservoir	25	5	20
Korokoro Stream at Belmont Trig	13	50	2
Mangaroa River at Tasman Vaccine Limited	19	20	5
1-hour			
Hutt River at Haywards Hill Reservoir	42	1.3	80
Pinehaven Stream at Pinehaven Reservoir	38	3.3	30
Mangaroa River at Tasman Vaccine Limited	31	10	10
Korokoro Stream at Belmont Trig	25	20	5
Hutt River at Mabey Road Depot	24	20	5
Hutt River at Birch Lane	20	50	2
Wainuiomata River at Wainui Reservoir	16	63	1.6
Hutt River at Regent Street	17	63	1.6
Waiwhetu Stream at Seaview WWTP	14	63	1.6
6-hours			
Hutt River at Haywards Hill Reservoir	90	1.7	60
Pinehaven Stream at Pinehaven Reservoir	79	5	20
Mangaroa River at Tasman Vaccine Limited	78	10	10
Hutt River at Mabey Road Depot	53	20	5
Korokoro Stream at Belmont Trig	45	50	2
Hutt River at Regent Street	36	63	1.6
Waiwhetu Stream at Seaview WWTP	32	63	1.6
Hutt River at Birch Lane	36	63	1.6
12-hours			
Hutt River at Haywards Hill Reservoir	109	2.5	40
Mangaroa River at Tasman Vaccine Limited	100	10	10
Pinehaven Stream at Pinehaven Reservoir	99	10	10
Hutt River at Mabey Road Depot	80	10	10
Korokoro Stream at Belmont Trig	74	20	5
Hutt River at Regent Street	55	50	2
Hutt River at Birch Lane	63	50	2
Hutt River at Shandon Golf Club	48	63	1.6
Waiwhetu Stream at Seaview WWTP	49	63	1.6



The August 2024 rainfall event caused widespread surface flooding and slips across Lower Hutt⁶. Rainfall during this event was primarily centred between the western hills and Stokes Valley catchment (Figure 13).

Rainfall depths at Belmont Trig indicate a 1 in 10-year AEP event for the 6-hour (64 mm) and 12-hour durations (80 mm), but less significant at shorter durations (1 in 2-year AEP event for the 30-minute duration and 1 in 5-year AEP event for the 1-hour duration).

At the Mabey Road Depot the event was a 1 in 5-year AEP to 1 in 10-year AEP event across all durations.

⁶ https://niwa.co.nz/sites/default/files/inline-images/Climate_Summary_August_2024_Final.pdf

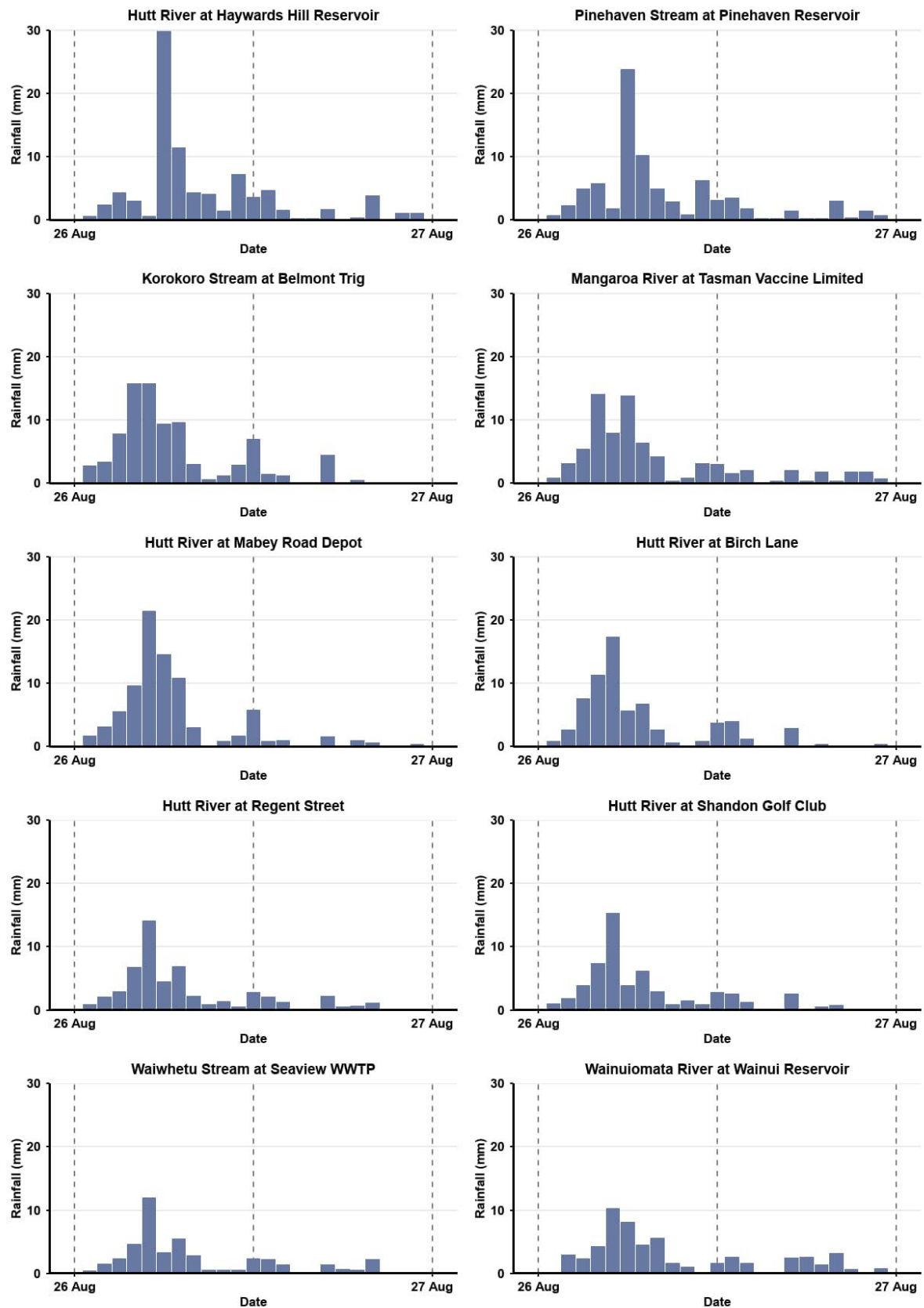


Figure 14. Hourly rainfall for each rainfall gauge 26 August 2024.



Table 7. Event maximum rainfall depths by duration and gauge. Results are presented only for gauges where the event ranked among the 20 highest rainfall depths for that duration.

Site	Max Rainfall (mm)	AEP (%)	1 in X AEP (yrs)
30 mins			
Hutt River at Haywards Hill Reservoir	26	2.5	40
Pinehaven Stream at Pinehaven Reservoir	21	10	10
Hutt River at Mabey Road Depot	20	10	10
Korokoro Stream at Belmont Trig	14	50	2
Wainuiomata River at Wainui Reservoir	11	63	1.6
1-hour			
Hutt River at Haywards Hill Reservoir	34	3.3	30
Korokoro Stream at Belmont Trig	24	20	5
Pinehaven Stream at Pinehaven Reservoir	26	20	5
Hutt River at Mabey Road Depot	26	20	5
Hutt River at Shandon Golf Club	17	63	1.6
Hutt River at Birch Lane	17	63	1.6
6-hours			
Korokoro Stream at Belmont Trig	64	10	10
Hutt River at Mabey Road Depot	68	10	10
Hutt River at Haywards Hill Reservoir	59	20	5
Hutt River at Birch Lane	53	20	5
Hutt River at Shandon Golf Club	41	50	2
Mangaroa River at Tasman Vaccine Limited	54	50	2
Pinehaven Stream at Pinehaven Reservoir	52	50	2
Hutt River at Regent Street	39	63	1.6
Waiwhetu Stream at Seaview WWTP	31	63	1.6
12-hours			
Korokoro Stream at Belmont Trig	80	10	10
Hutt River at Haywards Hill Reservoir	77	20	5
Hutt River at Mabey Road Depot	79	20	5
Mangaroa River at Tasman Vaccine Limited	64	50	2
Pinehaven Stream at Pinehaven Reservoir	71	50	2
Hutt River at Birch Lane	64	50	2
Hutt River at Shandon Golf Club	50	63	1.6
Hutt River at Regent Street	47	63	1.6



4.7 December 2021

Rainfall was widespread across the Hutt Valley in early December 2021 (Figure 15) causing the Hutt River to rise rapidly flooding the Riverbank car park, along with surface flooding across the Valley⁷. However, it was most significant in the western and lower Hutt Valley.

Figure 16 presents hourly rainfall totals at each of the gauges during the event and Table 8 shows the maximum rainfall depths and corresponding return periods recorded at each gauge by duration. Rainfall depths are presented only for gauges where the event ranked among the 20 highest rainfall depths for that duration.

The event was the largest rainfall event recorded at the Korokoro rainfall gauge since records began in 2017 over the 6-hour and 12-hour durations, second largest at the 1-hour duration and third largest at the 30-minute duration.

For the 12-hour duration, 107 mm was recorded (1 in 40-year AEP event) at Korokoro. Over 1-hour and 6-hour durations, recorded rainfall depths were equivalent to a 1 in 20-year AEP event.

At the Regent Street gauge on the western side of the valley floor, the event was a 1 in 10-year AEP to 1 in 20-year AEP event across all durations. However, at Shandon Golf Club and the Seaview WWTP, the event was a 1 in 5-year AEP event.

In the northern and eastern parts of the Hutt Valley, rainfall depths were typically a 1 in 2-year AEP event or less.

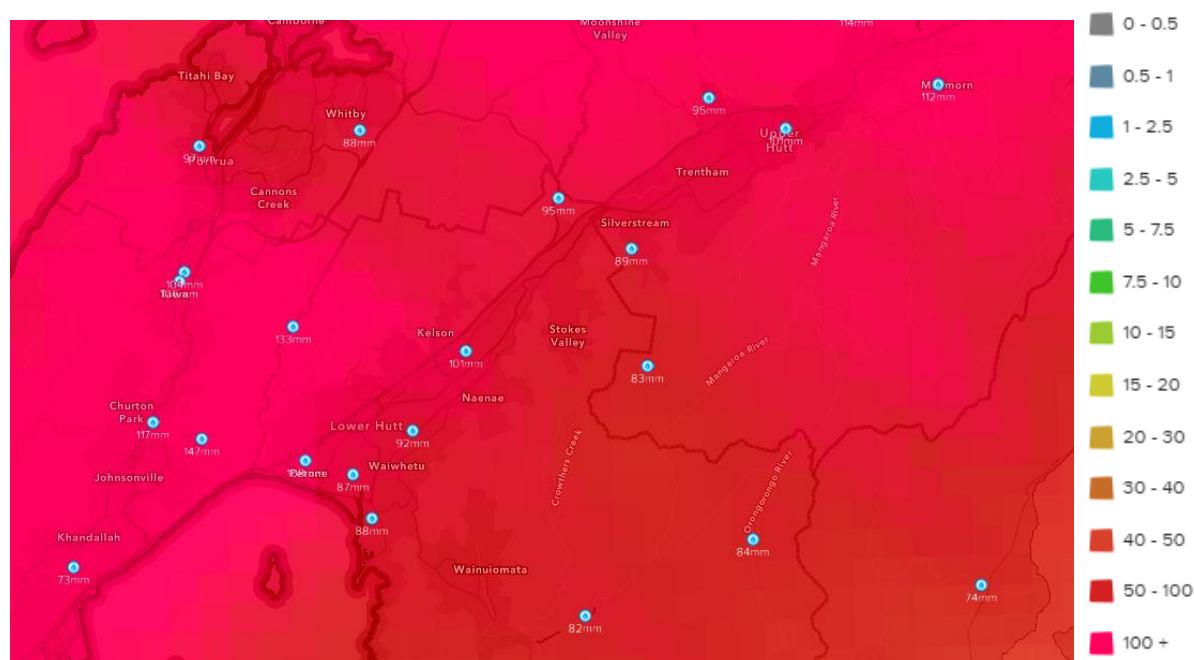


Figure 15. Cumulative rainfall depth (mm) across the greater Wellington Region between 12:00 AM 6 December 2021 and 12:00 AM 7 December 2021. Source: Moata (Mott MacDonald).

⁷ <https://www.rnz.co.nz/news/weather/457341/parts-of-wellington-get-more-than-a-month-s-rain-in-one-day>



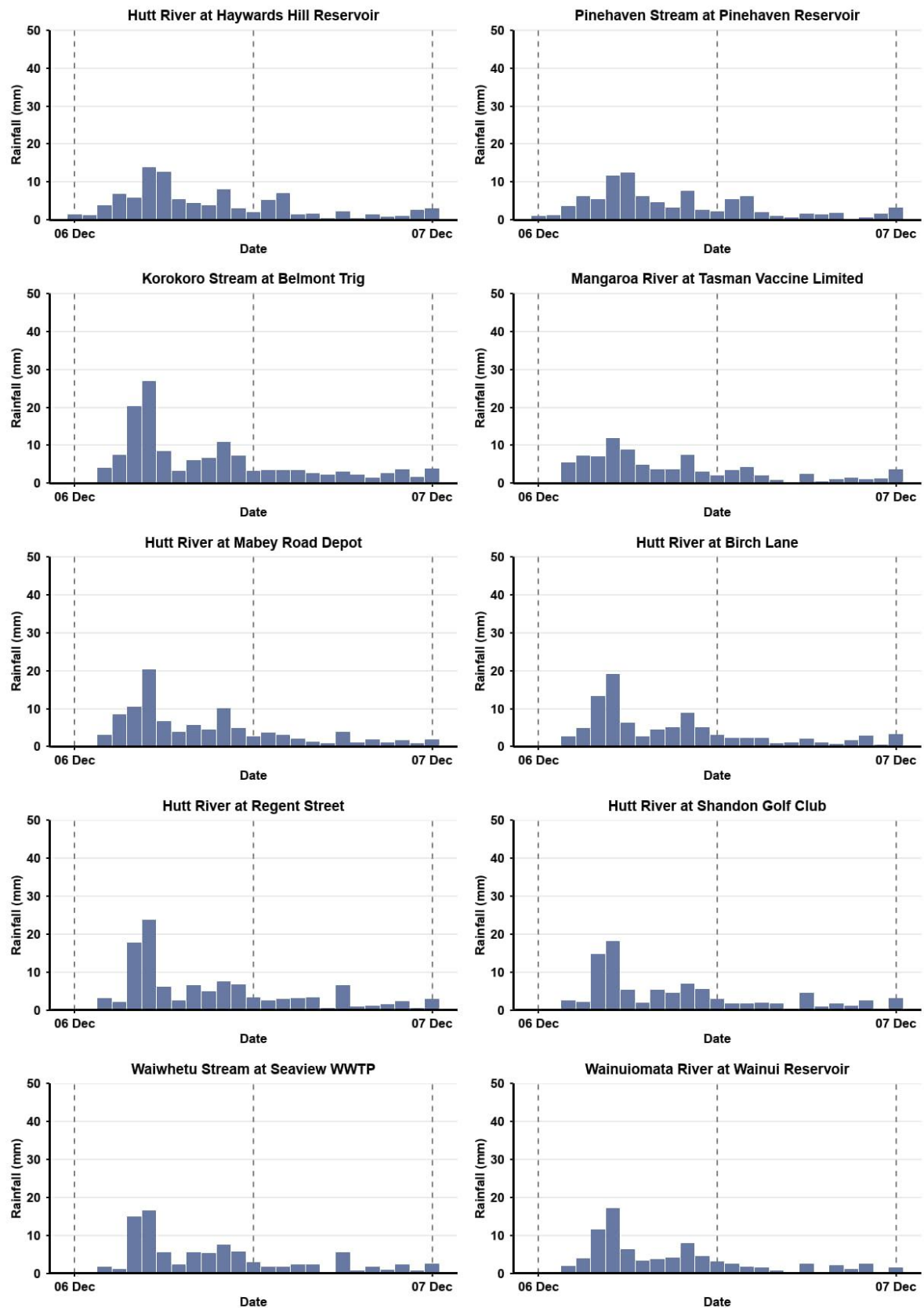


Figure 16. Hourly rainfall for each rainfall gauge 6 December 2021.



Table 8. Event maximum rainfall depths by duration and gauge. Results are presented only for gauges where the event ranked among the 20 highest rainfall depths for that duration.

Site	Max Rainfall (mm)	AEP (%)	1 in X AEP (yrs)
30 mins			
Hutt River at Regent Street	18	10	10
Hutt River at Shandon Golf Club	17	20	5
Waiwhetu Stream at Seaview WWTP	16	20	5
Korokoro Stream at Belmont Trig	19	20	5
Hutt River at Birch Lane	16	20	5
Wainuiomata River at Wainui Reservoir	14	50	2
Korokoro Stream at Belmont Trig	13	50	2
1-hour			
Hutt River at Regent Street	30	5	20
Korokoro Stream at Belmont Trig	32	5	20
Hutt River at Shandon Golf Club	24	20	5
Waiwhetu Stream at Seaview WWTP	24	20	5
Hutt River at Birch Lane	24	20	5
Wainuiomata River at Wainui Reservoir	22	50	2
Hutt River at Mabey Road Depot	21	50	2
6-hours			
Korokoro Stream at Belmont Trig	74	5	20
Hutt River at Regent Street	63	10	10
Hutt River at Shandon Golf Club	51	20	5
Waiwhetu Stream at Seaview WWTP	52	20	5
Hutt River at Haywards Hill Reservoir	50	20	5
Hutt River at Birch Lane	53	20	5
Hutt River at Mabey Road Depot	57	20	5
Mangaroa River at Tasman Vaccine Limited	46	50	2
Pinehaven Stream at Pinehaven Reservoir	47	50	2
Wainuiomata River at Wainui Reservoir	48	63	1.6
12-hours			
Korokoro Stream at Belmont Trig	107	2.5	40
Hutt River at Regent Street	88	10	10
Hutt River at Mabey Road Depot	85	10	10
Hutt River at Shandon Golf Club	71	20	5
Waiwhetu Stream at Seaview WWTP	72	20	5
Hutt River at Haywards Hill Reservoir	78	20	5
Pinehaven Stream at Pinehaven Reservoir	74	20	5



Site	Max Rainfall (mm)	AEP (%)	1 in X AEP (yrs)
Hutt River at Birch Lane	77	20	5
Mangaroa River at Tasman Vaccine Limited	69	50	2
Wainuiomata River at Wainui Reservoir	70	63	1.6



4.8 December 2025

The December 2025 event was spatially variable across the Hutt Valley. The rain radar shows and rainfall band extending from the north-west toward the south-east across the western hills and central Hutt Valley (Figure 17).

Figure 18 presents hourly rainfall totals at each of the gauges during the event and Table 9 shows the maximum rainfall depths and corresponding return periods recorded at each gauge by duration. Rainfall depths are presented only for gauges where the event ranked among the 20 highest rainfall depths for that duration.

The event was most significant over a 1-hour duration, recording 34 mm over 1 hour (1 in 20-year AEP event) at Korokoro and 29 mm (1 in 10-year AEP event) at Birch Lane. At these two gauges rainfall depths at the 30-minute duration were a 1 in 10-year AEP event.

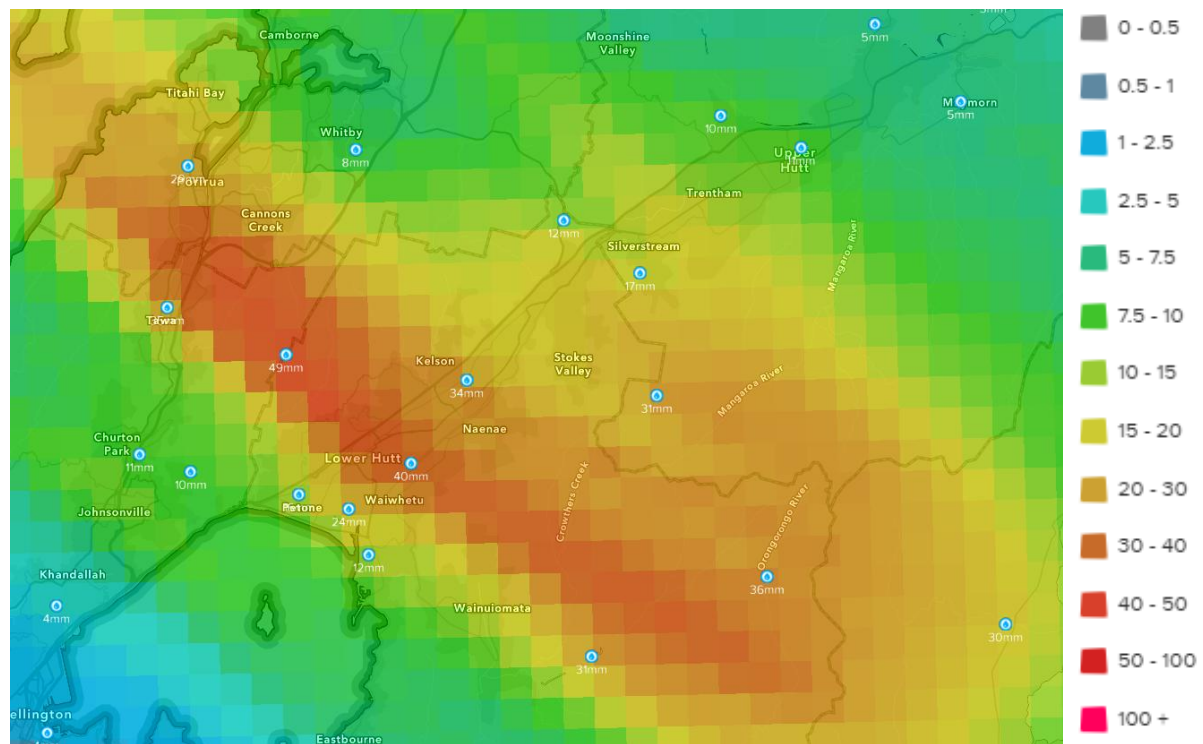


Figure 17. Cumulative rainfall depth (mm) across the greater Wellington Region between 12:00 PM 1 December 2025 and 12:00 PM 2 December 2025.
Source: Moata (Mott MacDonald).



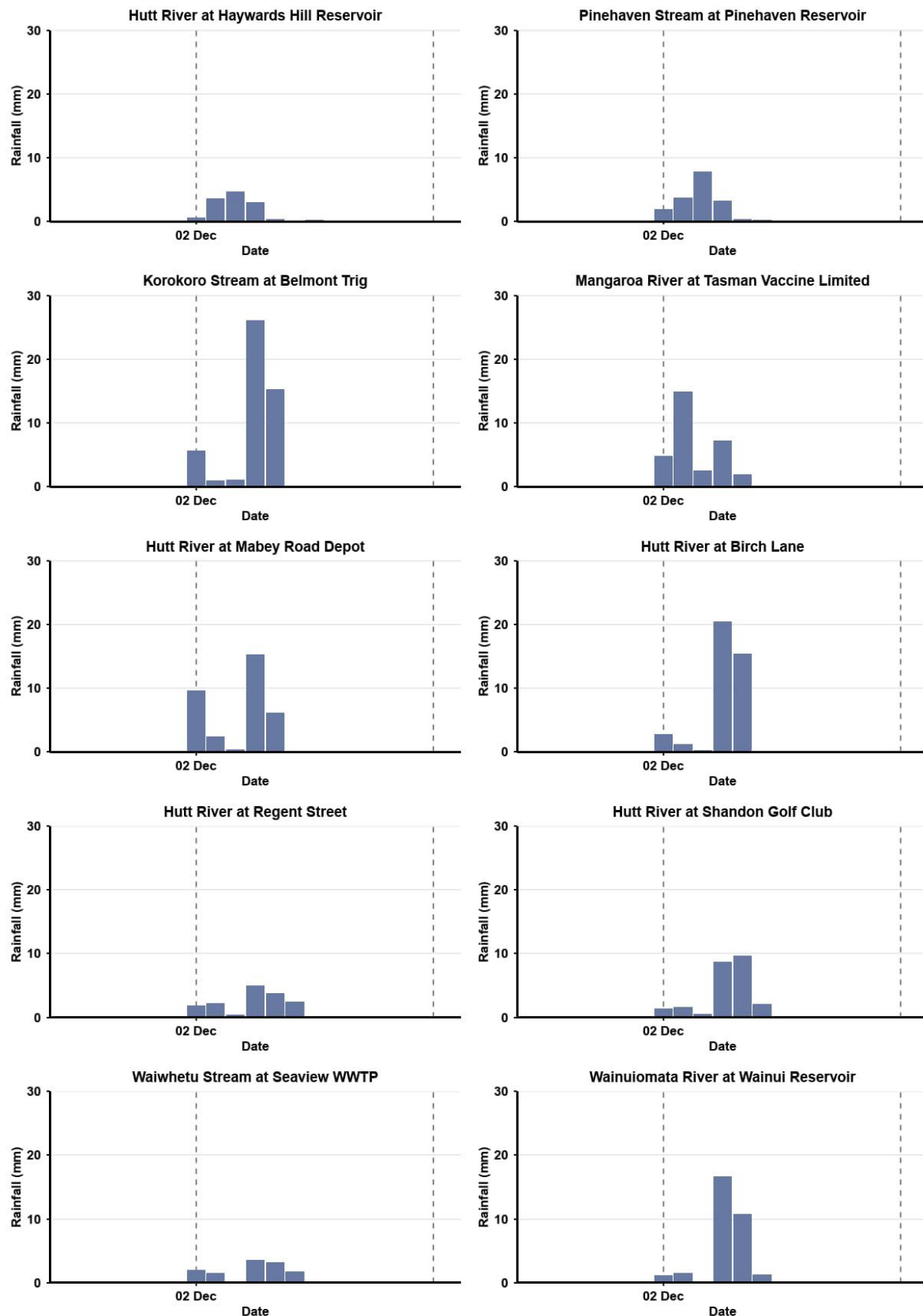


Figure 18. Hourly rainfall for each rainfall gauge 2 December 2025.



Table 9. Event maximum rainfall depths by duration and gauge. Results are presented only for gauges where the event ranked among the 20 highest rainfall depths for that duration.

Site	Max Rainfall (mm)	AEP (%)	1 in X AEP (yrs)
30 mins			
Korokoro Stream at Belmont Trig	22	10	10
Hutt River at Birch Lane	19	10	10
Wainuiomata River at Wainui Reservoir	16	20	5
Mangaroa River at Tasman Vaccine Limited	14	63	1.6
1-hour			
Korokoro Stream at Belmont Trig	34	5	20
Hutt River at Birch Lane	29	10	10
Wainuiomata River at Wainui Reservoir	21	50	2
Hutt River at Mabey Road Depot	18	50	2
Mangaroa River at Tasman Vaccine Limited	19	63	1.6
6-hours			
Korokoro Stream at Belmont Trig	49	20	5
Hutt River at Birch Lane	40	63	1.6



4.9 September 2020

Rainfall during this event was widespread across the Hutt Valley, with the largest rainfall depths recorded in the south-eastern part of the valley (Figure 19).

Figure 20 presents hourly rainfall totals at each of the gauges during the event and Table 10 shows the maximum rainfall depths and corresponding return periods recorded at each gauge by duration. Rainfall depths are presented only for gauges where the event ranked among the 20 highest rainfall depths for that duration.

Although, reportedly, the Wainuiomata catchment bore the brunt of this event⁸, the event was only a 1 in 2-year AEP event at Wainui Reservoir gauge at the 30-minute and 1-hour durations. The greatest intensity was recorded at Seaview WWTP with 21 mm recorded over 30-minutes (1 in 20-year AEP event) and 26 mm recorded over 1-hour (1 in 10-year AEP event). At 6-hour and 12-hour durations, the event was a 1 in 5-year AEP and 1 in 2-year AEP event, respectively.

Rainfall depths at Shandon Golf Club (just west of the Seaview WWTP) were estimated to be 1 in 5-year AEP events for 30-minute to 6-hour durations, and a 1 in 1.6-year AEP event over 12-hours.

Although rainfall recorded at Pinehaven indicate a 1 in 5-year AEP event over the shorter durations, the rain radar indicates that the Stokes Valley catchment may have received less rainfall compared to other areas.

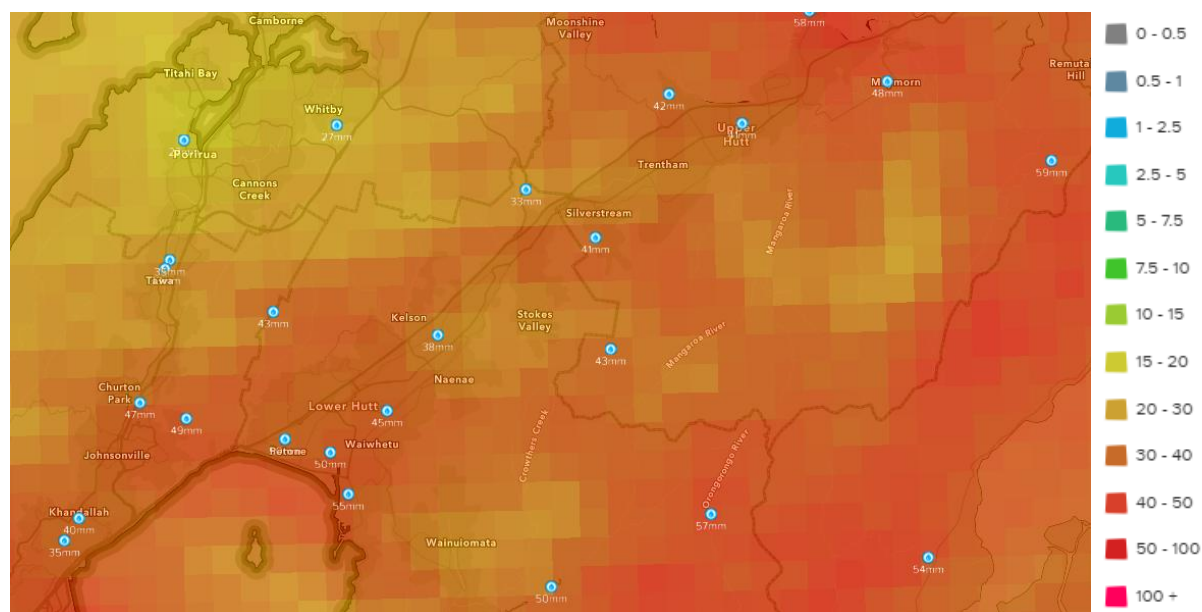


Figure 19. Cumulative rainfall depth (mm) across the greater Wellington Region between 12:00 AM 18 September 2020 and 12:00 PM 18 September 2020. Source: Moata (Mott MacDonald).

⁸ <https://www.stuff.co.nz/dominion-post/wellington/122810397/wellington-hit-by-deluge-of-rain-in-the-early-hours>



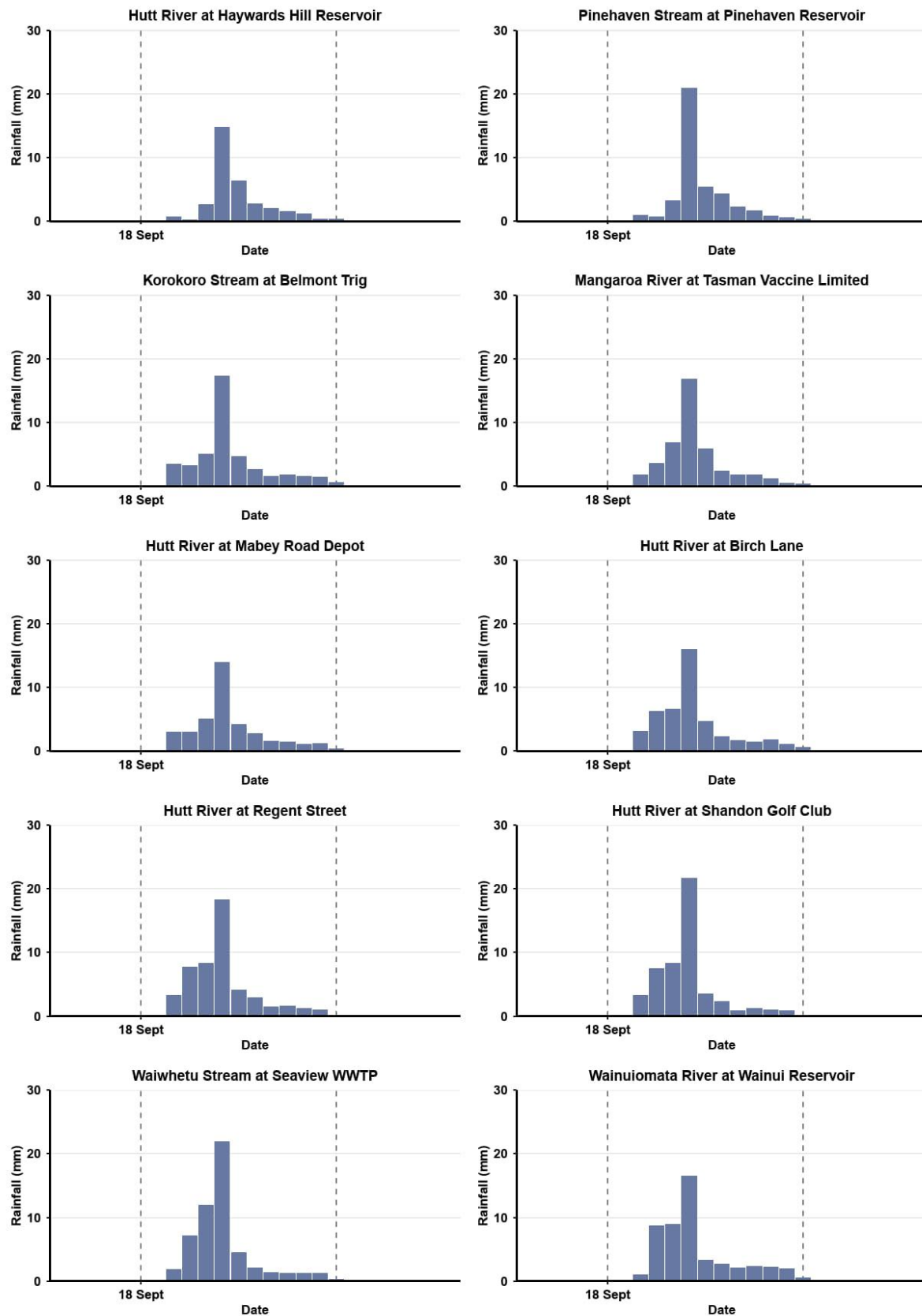


Figure 20. Hourly rainfall for each rainfall gauge 18 September 2020



Table 10. Event maximum rainfall depths by duration and gauge. Results are presented only for gauges where the event ranked among the 20 highest rainfall depths for that duration.

Site	Max Rainfall (mm)	AEP (%)	1 in X AEP (yrs)
30 mins			
Waiwhetu Stream at Seaview WWTP	21	5	20
Hutt River at Shandon Golf Club	18	20	5
Pinehaven Stream at Pinehaven Reservoir	18	20	5
Wainuiomata River at Wainui Reservoir	14	50	2
Hutt River at Regent Street	13	50	2
Mangaroa River at Tasman Vaccine Limited	13	63	1.6
1-hour			
Waiwhetu Stream at Seaview WWTP	26	10	10
Hutt River at Shandon Golf Club	23	20	5
Pinehaven Stream at Pinehaven Reservoir	23	20	5
Wainuiomata River at Wainui Reservoir	18	50	2
Hutt River at Regent Street	19	50	2
Korokoro Stream at Belmont Trig	18	63	1.6
Hutt River at Haywards Hill Reservoir	17	63	1.6
Mangaroa River at Tasman Vaccine Limited	18	63	1.6
Hutt River at Birch Lane	16	63	1.6
6-hours			
Hutt River at Shandon Golf Club	47	20	5
Waiwhetu Stream at Seaview WWTP	50	20	5
Hutt River at Regent Street	45	50	2
Pinehaven Stream at Pinehaven Reservoir	38	63	1.6
Hutt River at Birch Lane	39	63	1.6
12-hours			
Waiwhetu Stream at Seaview WWTP	55	50	2
Hutt River at Shandon Golf Club	50	63	1.6
Hutt River at Regent Street	50	63	1.6



4.10 April 2025

Rainfall associated with the April 2025 event was generally light to moderate across the Hutt Valley (Figure 21). However, the event was characterised by periods of locally intense short-duration rainfall.

Figure 22 presents hourly rainfall totals at each of the gauges during the event and Table 11 shows the maximum rainfall depths and corresponding return periods recorded at each gauge by duration. Rainfall depths are presented only for gauges where the event ranked among the 20 highest rainfall depths for that duration.

Rainfall records from the Seaview WWTP rainfall gauge indicate a maximum 30-minute rainfall depth of approximately 21 mm, corresponding to an estimated 1 in 20-year AEP event. The maximum 1-hour rainfall depth at the site was 22 mm, corresponding to an estimated 1 in 5-year AEP event.

Rainfall recorded over 30 minutes at Shandon Golf Club and Regent Street were equivalent to a 1 in 2-year AEP and 1 in 10-year AEP event, respectively. At these two gauges the event was a 1 in 2-year AEP event over 1-hour duration.

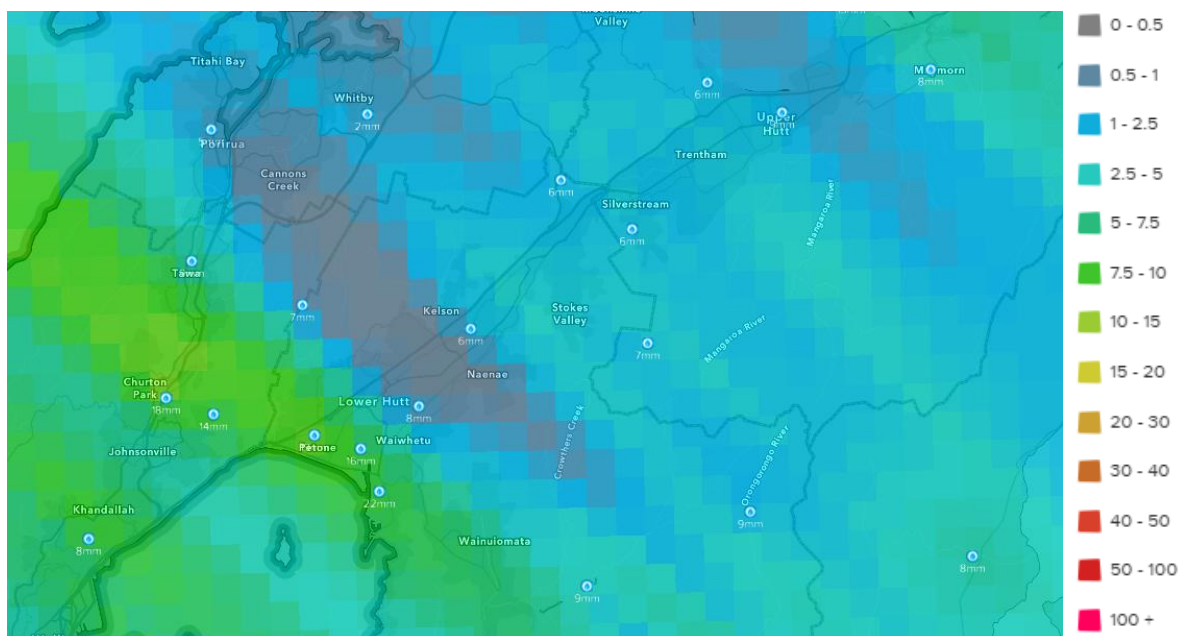


Figure 21. Cumulative rainfall depth (mm) across the greater Wellington Region between 12:00 am 8 April 2025 and 12:00 PM 8 April 2025.
Source: Moata (Mott MacDonald).



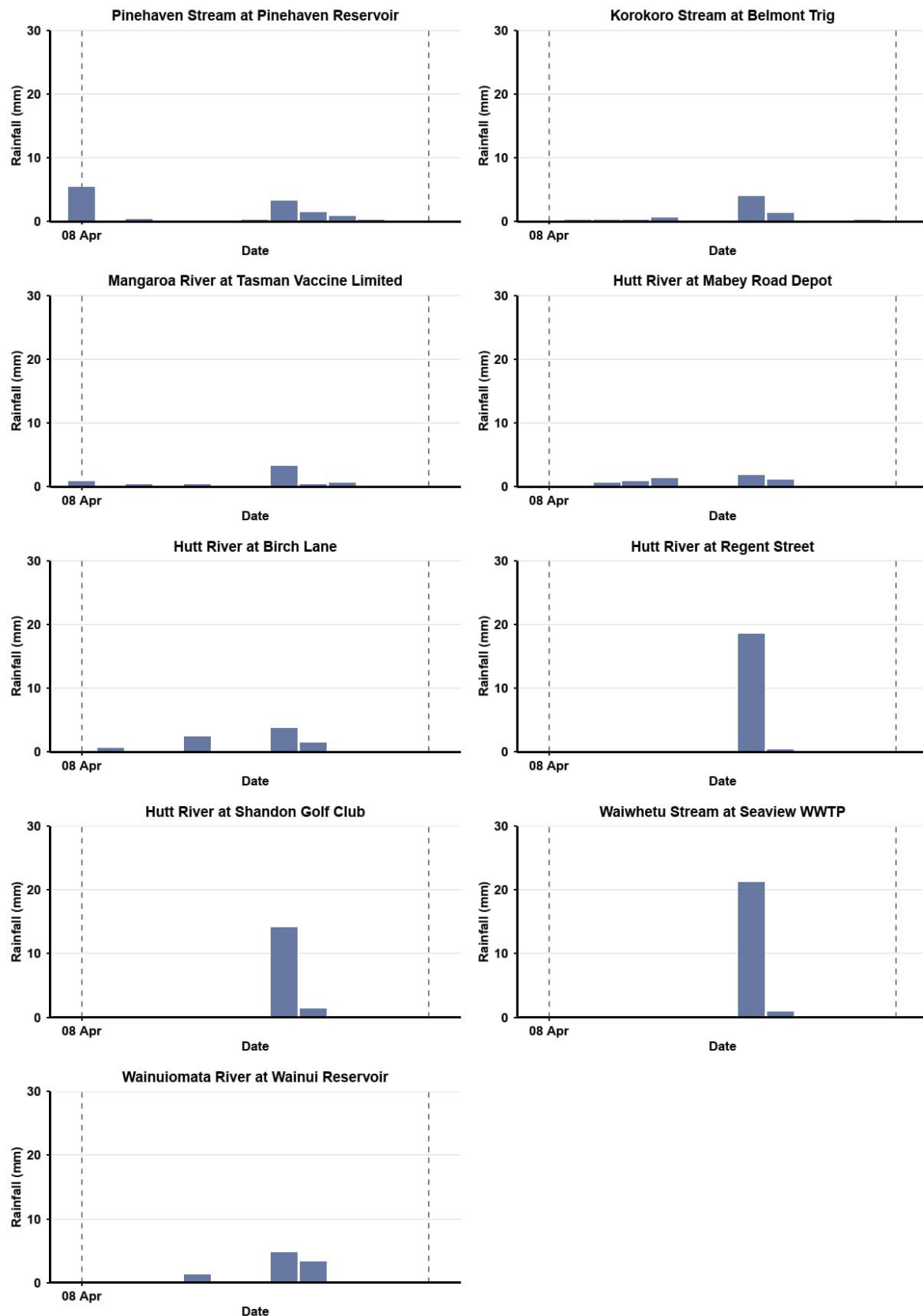


Figure 22. Hourly rainfall for each rainfall gauge 8 April 2025.



Table 11. Event maximum rainfall depths by duration and gauge. Results are presented only for gauges where the event ranked among the 20 highest rainfall depths for that duration.

Site	Max Rainfall (mm)	AEP (%)	1 in X AEP (yrs)
30 mins			
Waiwhetu Stream at Seaview WWTP	21	5	20
Hutt River at Regent Street	18	10	10
Hutt River at Shandon Golf Club	15	50	2
1-hour			
Waiwhetu Stream at Seaview WWTP	22	20	5
Hutt River at Regent Street	19	50	2
Hutt River at Shandon Golf Club	15	63	2



5.0 Closure

This assessment reviewed rainfall records across the Hutt Valley to identify the largest rainfall events that have occurred since 2015. Rainfall depths were analysed across a range of event durations and gauges to capture both short-duration, high-intensity storms and longer-duration events, as well as those that were widespread or more localised.

The analysis estimated the magnitude of these events through comparison with HIRDS depth-duration-frequency tables. The analysis shows that since 2015, the most significant events in the catchment were no greater than a 1 in 80-year AEP event (April 2026, December 2019 and May 2015), recorded over short-duration intervals (i.e., 30-minute and 1-hour). The April 2026 and December 2019 were also significant at 6-hour durations with return periods of 1 in 60-years.

Table 12. Largest 1 in X-year AEP event at each site for each duration

Site	30-min	1-hour	6-hours	12-hours
Hutt River at Birch Lane	40	80	10	10
Hutt River at Haywards Hill Reservoir	80	80	60	40
Hutt River at Mabey Road Depot	10	10	10	10
Hutt River at Regent Street	10	20	10	20
Hutt River at Shandon Golf Club	10	30	10	20
Korokoro Stream at Belmont Trig	10	20	20	40
Mangaroa River at Tasman Vaccine Ltd	10	20	10	20
Pinehaven Stream at Pinehaven Res.	20	30	20	10
Wainuiomata River at Wainui Reservoir	10	10	10	10
Waiwhetu Stream at Seaview WWTP	20	10	5	10

Sincerely,

SLR Consulting New Zealand Limited

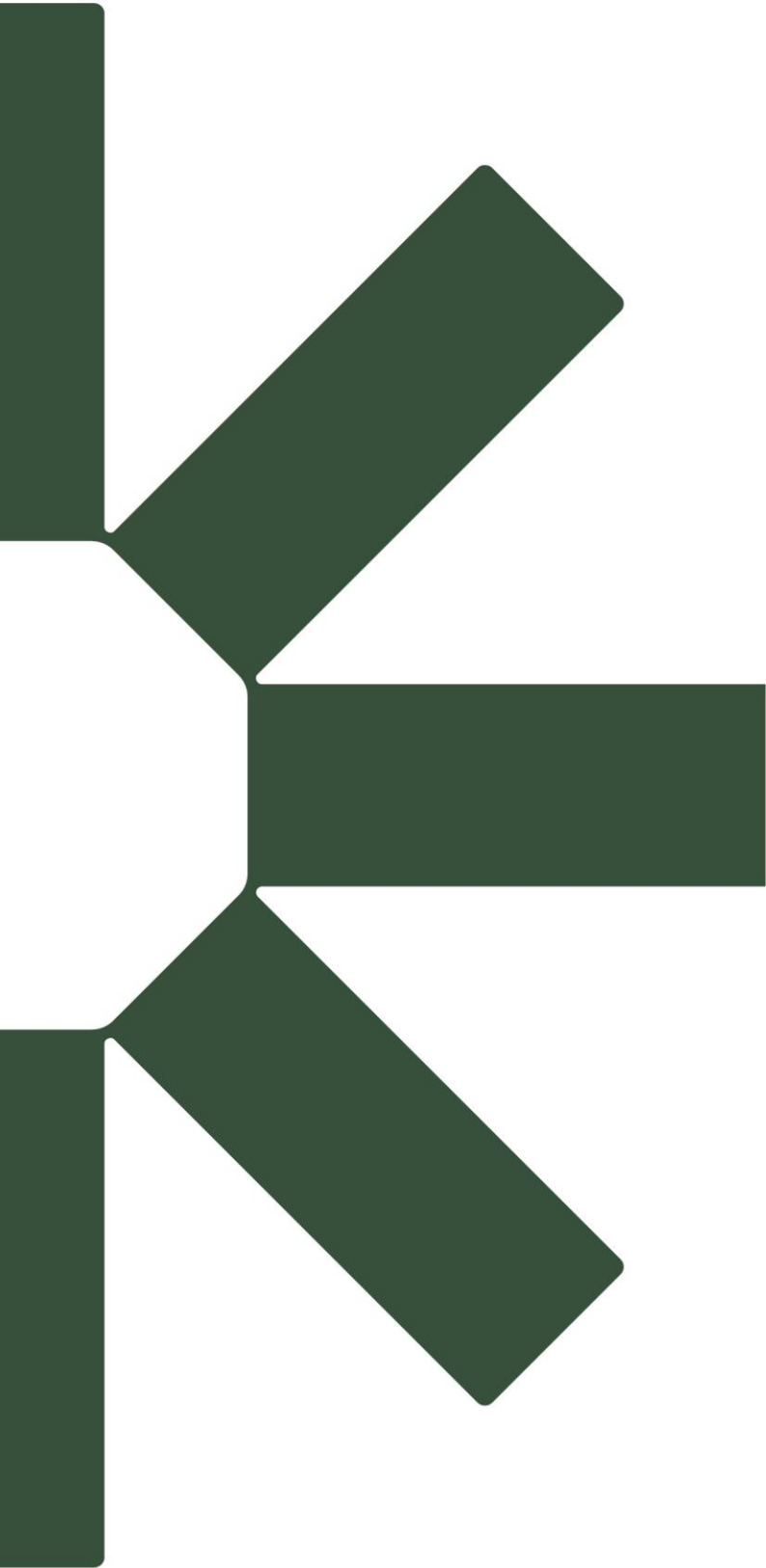


Deborah Maxwell
Principal – Hydrology



Charlotte Lockyer
Principal – Hydrology





Making Sustainability Happen

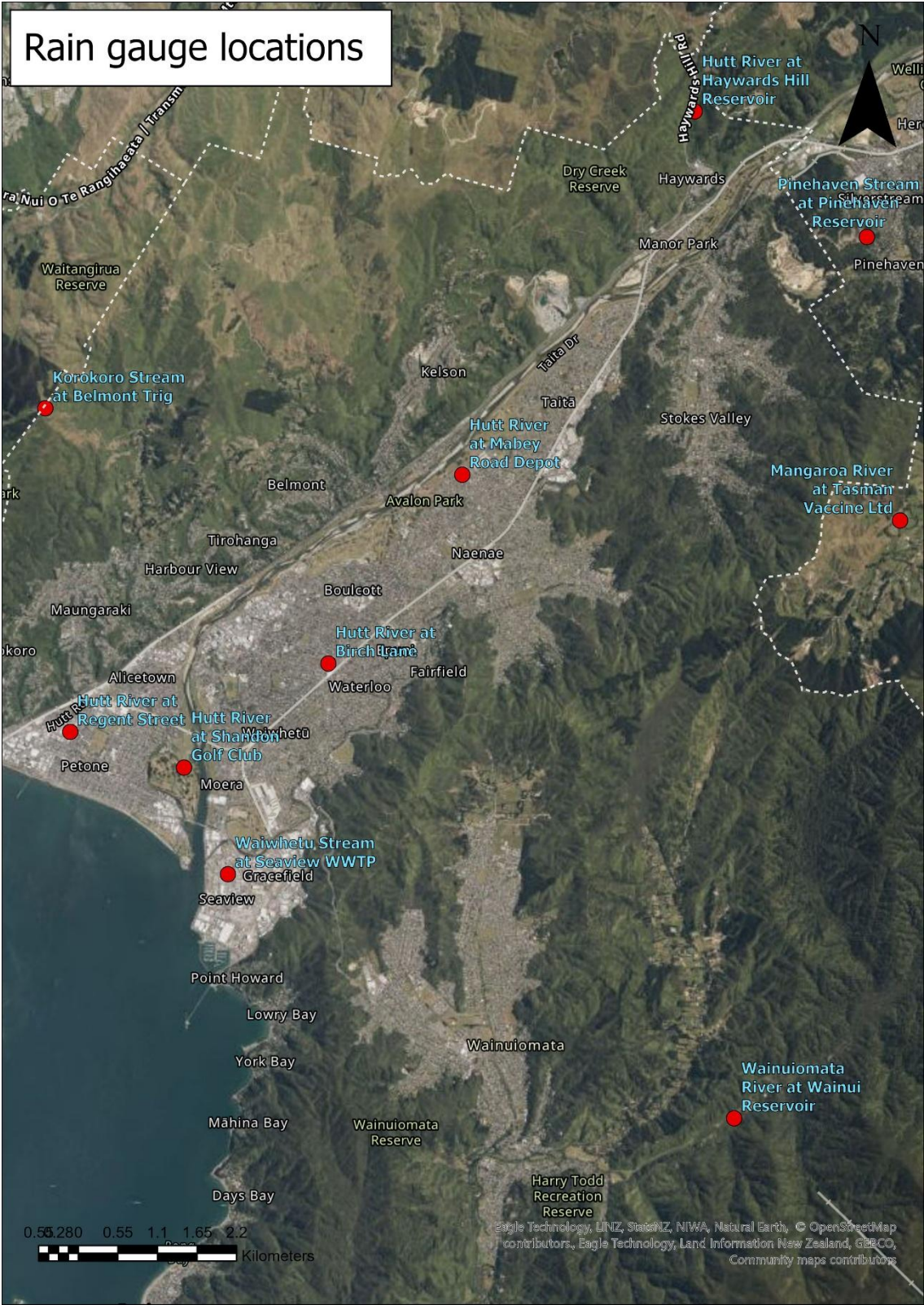
APPENDIX 2: Summary table – return interval 1 in X-year

Rain Gauge	May-15	Nov-16	Dec-19	Sept-20	Dec-21	Aug-24	Apr-25	Dec-25	Feb-26	Apr-26
Hutt River at Birch Lane	80	5	2	1.6	5	5		10	5	1.6
Hutt River at Haywards Hill Reservoir			80	1.6	5	40			5	80
Hutt River at Mabey Road Depot			10		10	10		2	10	10
Hutt River at Regent Street			2	2	20	1.6	10		5	1.6
Hutt River at Shandon Golf Club	30	10	1.6	5	5	2	2		2	1.6
Korokoro Stream at Belmont Trig			5	1.6	40	10		20	5	2
Mangaroa River at Tasman Vaccine Ltd	1.6	10	10	1.6	2	2		1.6	20	20
Pinehaven Stream at Pinehaven Reservoir	1.6	5	30	5	5	10			10	10
Wainuiomata River at Wainui Reservoir	10	2	1.6	2	2	1.6		5	10	10
Waiwhetu Stream at Seaview WWTP			1.6	20	5	1.6	20		5	2

Summary table – AEP %

Rain Gauge	May-15	Nov-16	Dec-19	Sept-20	Dec-21	Aug-24	Apr-25	Dec-25	Feb-26	Apr-26
Hutt River at Birch Lane	1.3	20	50	50	20	20		10	20	63
Hutt River at Haywards Hill Reservoir			1.3	63	20	2.5			20	1.3
Hutt River at Mabey Road Depot			10		20	10		50	10	10
Hutt River at Regent Street			63	50	5	63	10		20	63
Hutt River at Shandon Golf Club	3.3	10	63	20	20	50	50		50	63
Korokoro Stream at Belmont Trig			20	63	2.5	10		5	20	50
Mangaroa River at Tasman Vaccine Ltd	63	10	10	63	50	50		63	5	5
Pinehaven Stream at Pinehaven Reservoir	63	20	3.3	20	20	10			10	10
Wainuiomata River at Wainui Reservoir	10	50	63	50	50	63		20	10	10
Waiwhetu Stream at Seaview WWTP			63	5	20	63	5		20	50

APPENDIX 3: Rain gauge locations



APPENDIX 4: Event Maps

