



Auckland Storm Event

9 May 2023

Rapid Analysis

Research and
Evaluation Unit

RIMU



Summary

Rainfall totals for the 9 May 2023 event were approximately half that of Cyclone Gabrielle. Rainfall intensities for 9 May 2023 were generally less than the 10-year annual recurrence interval (ARI), but heavy bursts exceeding the 10-year annual recurrence interval (ARI) were recorded in the north, east, and west of the region. Despite the rainfall totals and intensities falling well short of previous major events, significant flooding occurred. River water levels peaked at similar levels to Cyclone Gabrielle and in two cases were higher – the Mahurangi River in the north and Mangemangeroa Creek in the east, which rose to higher levels than recorded during the Auckland Anniversary storm.

The extent of flooding relative to rainfall was likely influenced by saturated ground conditions, as evidenced by 7 of 10 soil moisture sites across the region being above field capacity (maximum water retention capacity of a soil). Overall, the 9 May 2023 storm was a moderately heavy rain event superimposed on an extremely wet environment.

Overview

We present a rapid analysis of rainfall and river water level data following the storm on 9 May 2023 to provide a comparison of the severity of the storm against recent extreme weather events, including the Auckland Anniversary storm (27 January 2023) and Cyclone Gabrielle (14 February 2023).

This analysis focuses on six sites each for rainfall and river water level, chosen to represent the spatial distribution of our hydrometric network. Annual recurrence interval (ARI) analyses were based on ARI values derived from the rain gauge at Albert Park, the longest continually operating rain gauge in the region.

Rainfall

Rainfall totals and intensities were calculated for six sites representing north, east, west, central, and southern areas in the Auckland region for four rain events in 2023 (Table 1). The data represent rainfall across the major catchment areas of the region. Rainfall statistics were derived for short to medium duration rainfall intensities (1-hour to 12-hour) due to the relatively short overall duration of the 9 May 2023 storm to allow comparison across the four events.

Event rainfall totals from 9 May 2023 were generally half that of Cyclone Gabrielle and even less than the Auckland Anniversary storm (with some exceptions). The 9 May 2023 storm had heavier 1-hr duration bursts than Cyclone Gabrielle, but 12-hr duration bursts were less heavy. Most rainfall intensities on 9 May were considerably less than the Auckland Anniversary storm with notable exceptions of 1-hr duration bursts in the north and southeast. Rainfall annual recurrence intervals (ARI) were generally less than the 10-yr ARI, but exceeded the 10-yr ARI in the north, east, and west for at least one measure (e.g. 1-hr duration intensity).

Table 1: Storm rainfall statistics for four major events in 2023.

Mahurangi Rainfall at Satellite (North)	Total event rainfall (approximate)	1-hr intensity	6-hr intensity	12-hr intensity	ARI colour code
9-May-23	100mm	45.5mm/hr	13.3mm/hr	7.6mm/hr	>100-yr ARI
24-Feb-23	98mm	23.5mm/hr	8.2mm/hr	6.6mm/hr	>50-yr ARI
14-Feb-23	159mm	16mm/hr	10.4mm/hr	9mm/hr	>10-yr ARI
27-Jan-23	178mm	28.9mm/hr	16.5mm/hr	11.3mm/hr	<10-yr ARI
Ararimu at Zanders (Northwest)					
9-May-23	80mm	27.5mm/hr	10.5mm/hr	6.7mm/hr	
24-Feb-23	136mm	41.5mm/hr	17.3mm/hr	10.6mm/hr	
12-14 Feb 2023	190mm	25mm/hr	9.3mm/hr	8.3mm/hr	
27-Jan-23	230mm	51.5mm/hr	25.4mm/hr	15.9mm/hr	
Albert Park (Central)					
9-May-23	70mm	37.5mm/hr	10.3mm/hr	5.8mm/hr	
24-Feb-23	60mm	10.5mm/hr	5.9mm/hr	4.2mm/hr	
14-Feb-23	139mm	15.5mm/hr	11.8mm/hr	9.5mm/hr	
27-Jan-23	300mm	92mm/hr	37.5mm/hr	21mm/hr	
Mangemangeroa Rainfall (East)					
9-May-23	84mm	45mm/hr	12.7mm/hr	7.9mm/hr	
24-Feb-23	59mm	22.5mm/hr	7.1mm/hr	4.4mm/hr	
14-Feb-23	88mm	14mm/hr	8mm/hr	6.4mm/hr	
27-Jan-23	163mm	19.9mm/hr	10.1mm/hr	9mm/hr	
Swanson Rainfall (West)					
9-May-23	115mm	32mm/hr	12.3mm/hr	8.6mm/hr	
24-Feb-23	117mm	21.9mm/hr	10.9mm/hr	7.6mm/hr	
14-Feb-23	230mm	20.9mm/hr	17.1mm/hr	13.8mm/hr	
27-Jan-23	246mm	50.5mm/hr	19.7mm/hr	13.3mm/hr	
Hunua Rainfall (Southeast)					
9-May-23	75mm	35.5mm/hr	10.8mm/hr	6.2mm/hr	
24-Feb-23	29mm	9mm/hr	3.2mm/hr	1.9mm/hr	
14-Feb-23	193mm	20.5mm/hr	16.5mm/hr	13.4mm/hr	
27-Jan-23	131mm	15.8mm/hr	9.7mm/hr	7.3mm/hr	

River water levels

Peak river water levels were tabled for six river monitoring sites which correspond to the six rain gauges (Table 2). Water levels observed were similar to those during Cyclone Gabrielle, and in the case of Mangemangeroa Creek, rose significantly higher than either Cyclone Gabrielle or the Auckland Anniversary Storm.

Table 2: Peak storm event river water levels. Red highlight is the highest of the four events, orange highlight is the second-highest.

Mahurangi at Argonaut (North)	Time (NZST)	Stage height
9-May-23	13:35	4.986m
14-Feb-23	04:40	4.361m
24-Feb-23	23:30	4.342m
27-Jan-23	19:20	5.083m

Meola Creek at Motions Rd (Central)	Time (NZST)	Stage height
9-May-23	12:45	1.833m
14-Feb-23	02:50	1.903m
24-Feb-23	21:55	1.250m
27-Jan-23	20:05	2.439m

Kaipara at Waimauku Rd (Northwest)	Time (NZST)	Stage height
9-May-23	23:30	7.825m
14-Feb-23	08:00	8.669m
25-Feb-23	01:10	8.144m
27-Jan-23	00:05	9.395m

Mangemangeroa Creek (East)	Time (NZST)	Stage height
9-May-23	12:56	3.141m
14-Feb-23	01:11	1.919m
24-Feb-23	20:29	0.701m
27-Jan-23	19:26	2.176m

Opanuku at Vintage (West)	Time (NZST)	Stage height
9-May-23	13:00	6.165m
14-Feb-23	02:50	6.208m
24-Feb-23	19:05	5.756m
27-Jan-23	15:55	6.549m

Wairoa River at Tourist Rd (Southeast)	Time (NZST)	Stage height
9-May-23	18:50	5.245m
14-Feb-23	03:15	5.642m
24-Feb-23	09:45	1.893m
28-Jan-23	02:05	4.988m

Influence of Soil Moisture

Flood levels from the 9 May 2023 event appear to be higher than otherwise expected based solely on event rainfall totals. However, 7 out of 10 soil moisture sites across the region were above field capacity (maximum water retention capacity) prior to the storm event. This indicates that shallow ground conditions were, in essence, fully saturated across the region, which likely exacerbated flood impacts.

Disclaimer

This memo contains provisional data and analysis and is intended for informational purposes only. For detailed questions concerning hydrometric data, please email EnvironmentalData@aucklandcouncil.govt.nz.

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