

Hydrology of Marlborough Summary for February 2023

Report prepared by Charlotte Tomlinson, 3rd March 2023.

Data from the Marlborough District Council's Environmental Monitoring network was primarily used in preparing this report and supplemented with data from sites operated by the Marlborough Research Centre, MetService, NIWA, and FENZ.

Executive Summary

In February, Marlborough was very fortunate to again avoid the severe impacts of a tropical cyclone, with Cyclone Gabrielle bringing strong winds and extremely heavy rainfall to parts of the North Island on Monday the 13th of February, resulting in flooding and loss of life as well as huge damage to property and infrastructure.

Cyclone Gabrielle followed a very similar path as was forecast by MetService, travelling south-east to sit over Great Barrier Island, before continuing to move south-east just off the East Cape of the North Island (see Figure 1).

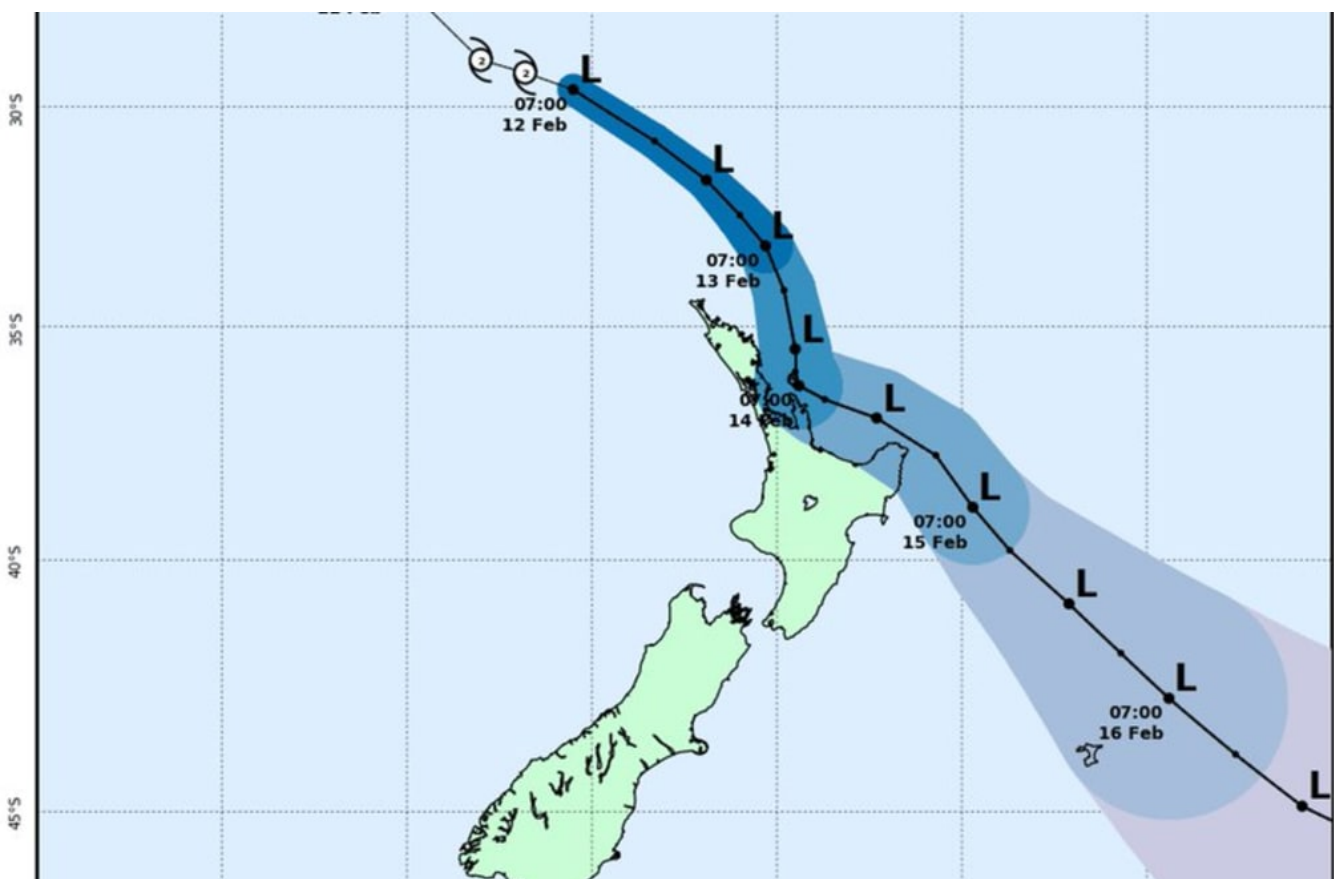


Figure 1. The predicted path of Cyclone Gabrielle, published by MetService on the 12th of February 2023.

In the south-east of the region it was wetter than average this month, with the Flaxbourne, Te Rapa, and Awatere rainfall sites all recording close to twice their average February rainfall. In Blenheim, rainfall was slightly lower than average at 40.2 mm for the month.

The Awatere River had a much higher mean flow than average in February (170% of average), while flow in the Wairau stayed above 15 m³/s throughout the month.

At the Grovetown Park weather station, average shallow soil moisture was 20.6%, slightly above the long-term average of 18.9%. The 22-23 summer season hasn't been overly dry, with a potential water deficit of -201.1 mm, 74% of the long-term average.

La Niña is expected to transition to neutral ENSO conditions during March, bringing variable temperatures and rainfall patterns to Marlborough throughout autumn. More frequent low pressure over the Tasman Sea will lead to periods of westerly winds, bringing more typical cold fronts. The remnant effect of La Niña could see a sub-tropical or tropical moisture plume reach Marlborough at some point this season.

Rainfall

Rainfall from Cyclone Gabrielle was seen in the eastern Marlborough Sounds and further along the east coast on the 14th of February. Kenepuru Head received 107 mm of rain over 24 hours, with several hours of heavier rainfall (8-10 mm/hr). Picton recorded 56 mm of rainfall in 24 hours, with the heaviest rain at 8 mm/hr.

Te Rapa in the lower Waima River catchment received 60 mm in the same period. There was much heavier rainfall in the Kaikoura Ranges south of the Marlborough/Canterbury boundary, with over 200 mm of rain recorded in 24 hours at the Environment Canterbury site Snowflake Ridge, which is at approximately 900 m elevation in the ranges behind Kaikoura township.

Subsequently, the south-east of the region was wetter than average this month, with Te Rapa recording 150 mm and the Flaxbourne recording 109 mm of rain in February (both about twice the average February rainfall). The Awatere rainfall site recorded 103 mm in February, also nearly double the average monthly rainfall.

Blenheim rainfall for the month was slightly lower than average at 40.2 mm.

Monthly data and averages for representative rainfall sites can be seen below in Figure 2, while monthly rainfall totals for all sites are listed in Table 1 below.

Figure 2. Monthly rainfall totals for 2023 from 6 key sites around Marlborough, compared to average monthly rainfall totals.

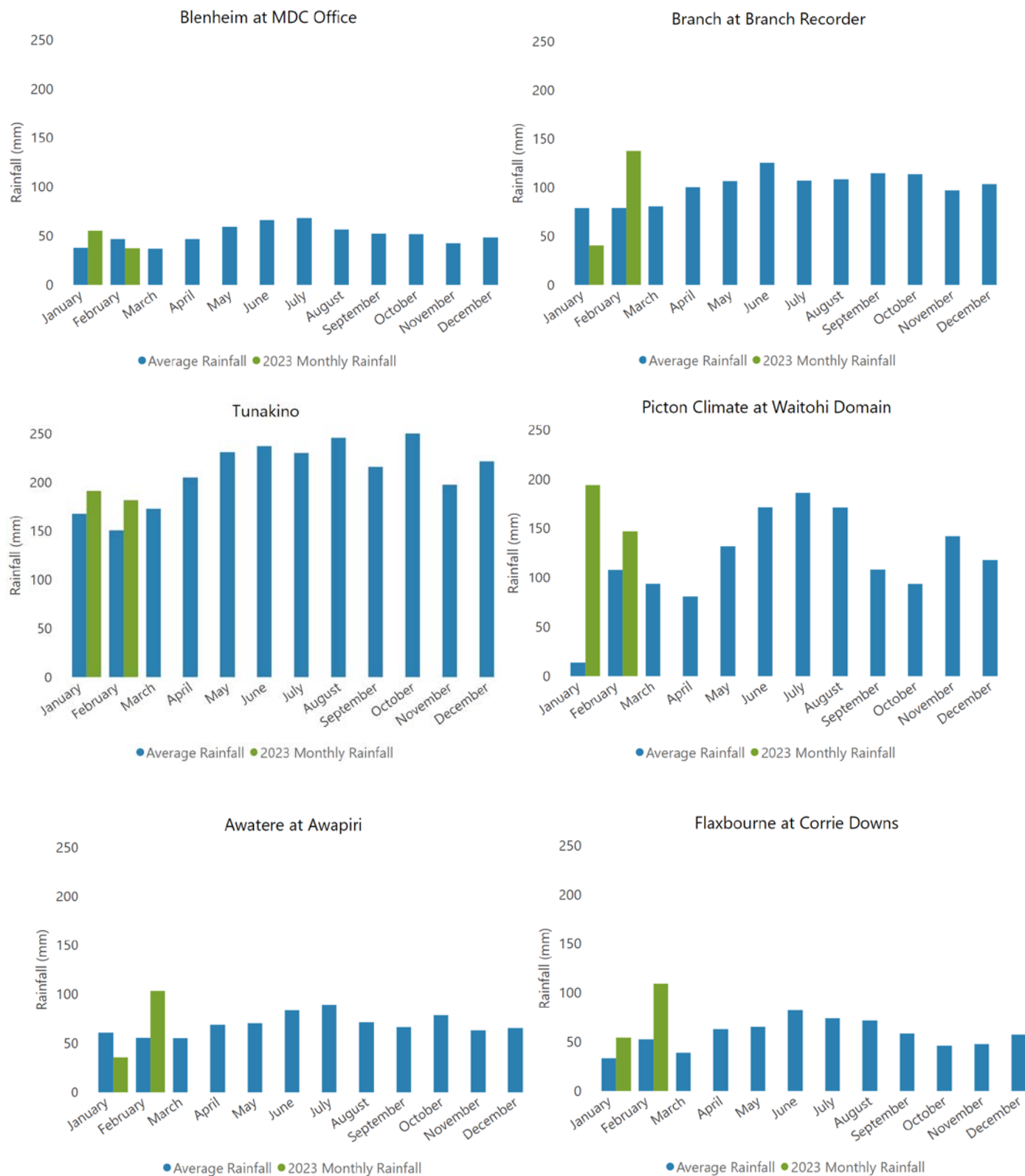


Table 1. 2023 monthly rainfall totals (mm) at rainfall monitoring sites in Marlborough.

Site	January	February
Awatere at Awapiri	36	103
Awatere Glenbrae NRFA	50	46
Beneagle at Farm Stream	78	57
Blenheim at MDC Office	56	38
Branch at Branch Recorder	41	138
Flaxbourne at Corrie Downs	54	109
Kaituna Rainfall at Higgins Bridge	101	111
Kenepuru Head NRFA	179	247
Koromiko NRFA	233	111
Lake Elterwater Climate	67	113
Lansdowne NRFA	42	87
Malings	14	90
Mid Awatere Valley NRFA	25	90
Molesworth NRFA	18	89
Omaka at Ramshead Saddle	73	78
Onamalutu at Bartletts Creek Saddle	88	109
Onamalutu at Hilltop Road NRFA	110	98
Picton Climate at Waitohi Domain	194	147
Pudding Hill NRFA	60	
Rai at Rai Falls	150	156
Rai Valley NRFA	188	173
Rarangi at Driving Range	71	72
Red Hills	46	140
St Arnaud NRFA	42	84
Taylor at Taylor Pass Landfill	53	41
Taylor at Tinpot	104	74
Te Rapa	52	152
Top Valley at Staircase Ridge	71	145
Tor Darroch NRFA	36	91
Tunakino	191	182
Upper Clarence NRFA	20	22
Waihopai at Craiglochart	21	81
Waihopai at Spray Confluence	19	71
Waikakaho	95	56
Waikawa at Boons Valley	243	169
Wairau at Narrows	43	54
Wairau Valley at Southwold	41	97
Wakamarina at Twin Falls	100	139
Ward NRFA	36	115
Wye at Charlies Rest		63

River Flows

The Wairau River at State Highway One had two small freshes on the 2nd and 6th of February following rain events. This was followed by a period of declining flow through to the 22nd, with minimum flow for February just above 15 m³/s. The last week of February saw small inputs to the river lift flow slightly.

In February, the Awatere river had a much higher mean flow than average (170% of average), due to the prevailing south-east direction of weather and rainfall throughout February. The highest flows for the month were on the 23rd and 26th, of approximately 45 and 80 m³/s respectively.

The Waihopai river also had several spikes in flow throughout the month, following on from rainfall in the upper catchment.

A summary of river flows for February 2023 can be seen below in Table 2.

Table 2. A summary of river flows in Marlborough for February 2023.

River	Site	February mean flow 2023 (m ³ /s)	February mean flow all records (m ³ /s)	% of monthly average	Records begin	Catchment area (km ²)
Pelorus	Bryants	13.39	12.24	109	1977	375
Rai	Rai Falls	5.16	6.82	76	1979	211
Kaituna	Higgins Bridge	1.17	1.89	62	2006	133
Branch	Intake Weir	12.23	16.94	72	1958	550
Wairau	Barnetts Bank	40.34	52.93	76	1960	3,430
Ohinemahuta	Domain	0.325	0.814	40	1998	33
Waihopai	Craiglochart	7.45	7.97	93	1960	764
Awatere	Awapiri	14.80	8.69	170	1977	987
Omaka	Gorge	0.517	0.554	93	1994	90
Taylor	Borough Weir	0.084	0.185	45	1961	64
Flaxbourne	Corrie Downs	0.089	0.148	60	2003	70

Soil Moisture

At the Grovetown Park weather station, average shallow soil moisture was 20.6%, slightly above the long-term average of 18.9%. The soil moisture deficit at the start of March can be seen below in Figure 3, while the soil moisture anomaly map (Figure 4) shows Marlborough soils are normal to slightly wetter than normal for this time of year.

The potential water deficit for February was -70.8 mm (the difference between 40.2 mm of rainfall and 111.0 mm potential evapotranspiration). The potential water deficit for the summer months December 2022 – February 2023 was -201.1 mm, which is 74% of the long term average.

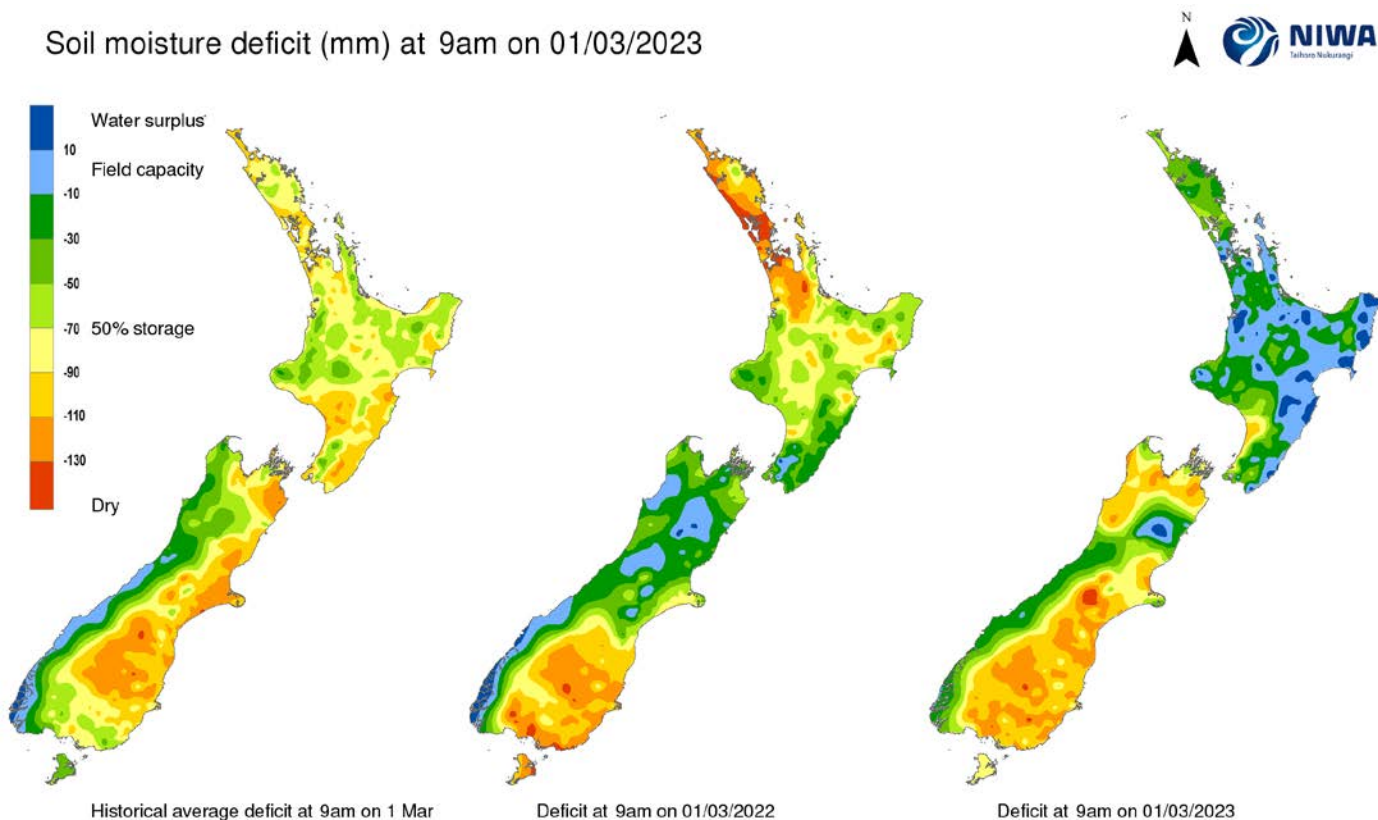


Figure 3. Soil moisture deficit maps of New Zealand, retrieved from NIWA on 01/03/2023.

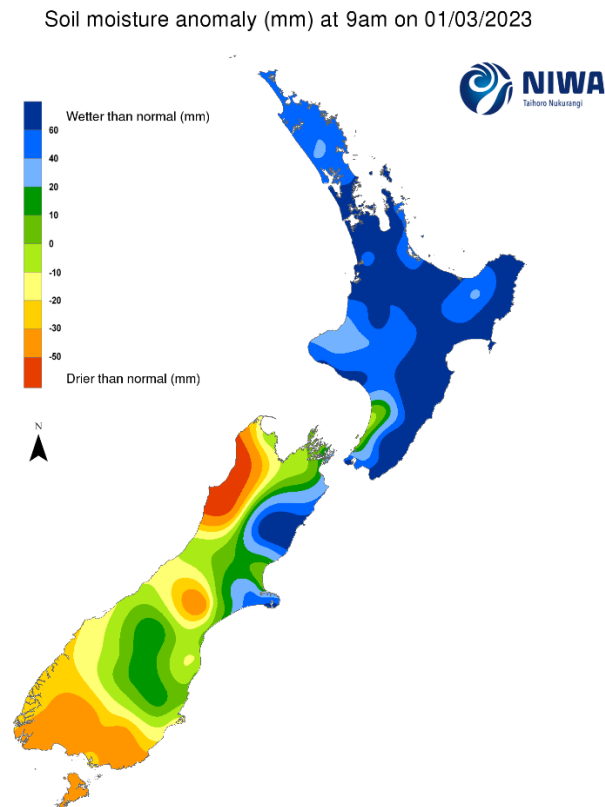


Figure 4. Soil moisture anomaly map of New Zealand, retrieved from NIWA 01/03/2023.

NIWA Seasonal Climate Outlook March – May 2023

The El Niño Southern Oscillation (ENSO) is expected to transition from La Niña to neutral conditions during March, bringing variable air flows, temperatures, and rainfall patterns to Aotearoa New Zealand throughout autumn. More frequent low pressure over the Tasman Sea and South Island will lead to periods of westerly winds. These winds will bring more typical cold fronts. The remnant effect of La Niña could see a sub-tropical or tropical moisture plume reach Marlborough at some point this season.

The predictions for Marlborough/Tasman from March to May are:

- 🌡️ Temperature – near or above average
- ☁️ Rainfall – near average
- 🌿 Soil Moisture – near or below average
- 🌊 River Flows – near or below average