

West Coast Regional Council

Flood Event Report

15th & 24th July 2026



Environmental Science - Hydrology

August 2026

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Executive Summary.....	5
Event Overview	7
15 July 2026.....	7
24 July 2026.....	7
Available Data.....	8
Ground Based Data	8
<i>MetService Rain Radar Data.</i>	9
Antecedent conditions	12
Rainfall Observations	14
15 th July 2026.....	15
24 th July 2026.....	16
Comparison	18
Meteorological Setting	18
Large-scale climate setting	18
Frequency Analysis	19
Hydrological Response	20
15 th July 2026.....	21
24 July 2026.....	22
Discussion.....	22
Historical context and significance	23
Historical Events	23
Limitations	25
Return Period Analysis – HIRDSv4.....	25
Rain Gauge Data.....	25
Conclusion	25
References.	28
Technical Appendices	29
Hourly gauge corrected Rain Radar Images	29
15 July 2026 starting at 14:00 NZST (Radar is in UTC).....	29
.....	29
Hourly gauge corrected Rain Radar Images	30
24 July 2026 starting at 00:00 NZST (Radar is in UTC).....	30
Data from other sources, Kiwirail Graphs, screenshots etc.	36

Executive Summary

Two short-duration convective rainfall events affected Greymouth on 15 and 24 July 2026, producing rapid rises in urban waterways and significant localised surface flooding. The events were characterised by substantial variation in rainfall over short distances, with the most intense rainfall occurring between or beyond the West Coast Regional Council (WCRC) and Earth Sciences New Zealand (ESNZ) rainfall stations.

The 24 July event was the more significant of the two, producing higher water levels across the three monitored urban waterways and considerable surface flooding in Greymouth CBD, Cobden and Stillwater. Rain gauge data paired with satellite imagery identified a concentrated rainfall band passing over parts of the Greymouth urban area over a short period producing high intensity rainfall. Although WCRC Office and ESNZ Greymouth Aero rainfall stations only received 15 mm and 24 mm over 1 hour, and 20 mm and 45.6mm over 2 hours respectively, only the ESNZ gauge recorded rainfall exceeding High Intensity Rainfall Design System (HIRDSv4) estimates, representing a 2 to 5 year ARI at 1 hour and a 5 to 10 year ARI at 2 hours. Third party rain gauge data within the catchment, supplied by KiwiRail recorded 46 mm in one hour and 85 mm in two hours. This two-hour total was between the HIRDSv4 80 and 100 year ARI estimates. The same gauge recorded an approximate six-hour total of 109.6 mm Significantly higher than the 6 hour totals observed at either the WCRC and ESNZ sites.

It should be noted that this result does not necessarily mean that Greymouth experienced an 80 year storm. The HIRDSv4 derived return period estimate applies to one rainfall duration at one third party monitoring location. Additional third-party rain gauges elsewhere in the catchment recorded rainfall with substantially lower ARIs, demonstrating the highly localised nature of the event. A comparison of key parameters with respect to each storm are summarised in the Table 1.

Sawyers Creek, Saltwater Creek and Cobden Cut responded rapidly during both events, with all three recorded higher peak levels on 24 July. Along with other un-monitored urban waterways, their relatively small catchments, high proportions of impervious surfaces and short times of concentration make them particularly responsive to short-duration, high-intensity rainfall. Any increase in the magnitude or frequency of this rainfall has significant implications for the design capacity and performance of urban stormwater systems, including culverts.

The contrasting responses demonstrate the importance of rainfall location and catchment scale. Intense rainfall over Greymouth's small, steep and substantially impervious urban catchments can generate damaging runoff within minutes, without producing a significant response in the much larger Grey River. Main-river monitoring alone therefore does not provide an adequate indication of emerging urban flood

The events demonstrate the limitations of relying on individual rainfall gauges when monitoring convective storms. Weather radar, and real-time urban water-level observations were necessary to identify the rainfall band and explain the observed impacts. These information sources should continue to be integrated when monitoring and responding to localised thunderstorm events.

Table 1: *Comparison of rainfall totals across selected durations and the principal impacts of the 15 and 24 July storm events.*

Parameter	15 July	24 July
Principal period	Afternoon, approximately 3:15–3:55 pm	Morning, approximately 2:00 – 4:00 am
Highest available 30 min rainfall	11.2 mm at Pigeon Ck CWS (ESNZ)	19.3 mm at Ahaura River at Gorge
Highest available one-hour rainfall	16.2 mm at FENZ 12820	Approximately 46 mm at KiwiRail 11846
Highest available two-hour rainfall	22.6 mm at Grey River at Haupiri	Approximately 85 mm at KiwiRail 11846
Highest available six-hour rainfall	38.4 mm at Grey River at Haupiri	Approximately 109.6 mm at KiwiRail 11846
Highest assessed rainfall rarity	Below the assessed HIRDS thresholds	Between the 80- and 100-year ARI estimates over two hours at one location
Sawyers Creek peak	3.417 m	3.730 m
Saltwater Creek peak*	1.586 m	2.039 m
Cobden Cut peak ¹	0.562 m	1.283 m
Principal reported impacts	Localised flooding, including southern Greymouth and Karoro	More widespread flooding across Greymouth, Cobden and surrounding communities

* Tidally influenced; recorded levels reflect both catchment runoff and downstream conditions.

Event Overview

Both events occurred in atmospheric conditions favourable for convective rainfall. Unlike widespread frontal systems, thunderstorms can develop and intensify rapidly, with the most intense rainfall affecting corridors only a few kilometres wide. Forecasts and thunderstorm outlooks can identify the potential for convection over a broader area, but the precise location, timing and intensity of individual rainfall cells may remain uncertain until they develop. Weather radar and real-time observations therefore become particularly important during the event. The following sections provide a chronological overview of each event.

15 July 2026

The first event occurred during the afternoon of Wednesday 15 July. MetService issued a Severe Thunderstorm Warning for Grey and Westland at approximately 3:15 pm, based on gauge corrected weather radar observations. The warning identified intense rainfall and the potential for localised surface flooding.

The principal high-intensity phase was short lived. Radar imagery showed a narrow thunderstorm cell crossing southern Greymouth before moving inland and weakening. The warning was lifted at approximately 3:55 pm, giving an identified warning and event period of about 40 minutes. Rainfall and water-level responses continued beyond this period, with Sawyers Creek peaking at 5:30 pm and the tidally influenced Saltwater Creek and Cobden Cut reaching their recorded peaks during the early hours of 16 July.

The narrow rainfall corridor crossed southern Greymouth and affected the Karoro and Sawyers Creek areas. Much of the highest-intensity rainfall passed between the WCRC and ESNZ rain gauges, resulting in comparatively modest totals at those stations despite reported flooding and the rapid response recorded in Sawyers Creek.

24 July 2026

The second event occurred during the early morning of Friday 24 July. The most intense rainfall was reported between approximately 2:00 am and 4:00 am, representing a concentrated high-intensity period of around two hours within a broader rainfall accumulation period of approximately six hours.

Gauge corrected weather radar imagery showed a broader rainfall footprint across Greymouth and the lower Grey catchment than on 15 July, but rainfall intensity remained highly variable within that area. Embedded high-intensity rainfall affected parts of the urban area, with the largest supplementary observations recorded at the KiwiRail gauges.

Urban water levels rose rapidly during and immediately following the most intense rainfall. Sawyers Creek peaked at 5:15 am and Saltwater Creek at 5:45 am, approximately one to two hours after the principal rainfall period. Cobden Cut peaked later, at 8:09 am, while the Grey River at Dobson reached its modest peak at 5:15 pm.

Table 2: Met Forecast Thunderstorm Warnings

Date and Timing	MetService Forecast
Wednesday 15 July 2026, approximately 3:15 to 3:55 pm	Issued on: 15:24pm Wednesday 15 th July. Type: Severe Thunderstorm Warning Area: Grey and Westland. Valid: 15:15 to 15:15 pm on Wednesday.

	Location: Greymouth, Lake Brunner, Moana, Inchbonnie and Kopara. Radar detected severe thunderstorms near Greymouth moving east-southeast. Thunderstorms were expected to produce large hail, possible tornadoes, frequent lightning, and intense localised rainfall. Forecasted rainfall amounts: none stated. Cancellation: 3:15 pm Wednesday 15 July 2026.
Friday 24 July 2026, mainly 2:00 to 4:00 am	No Event Warning Issued <i>Forecasted hourly intensities of 24 mm was just below Metservice Warning threshold of 25mm.</i>

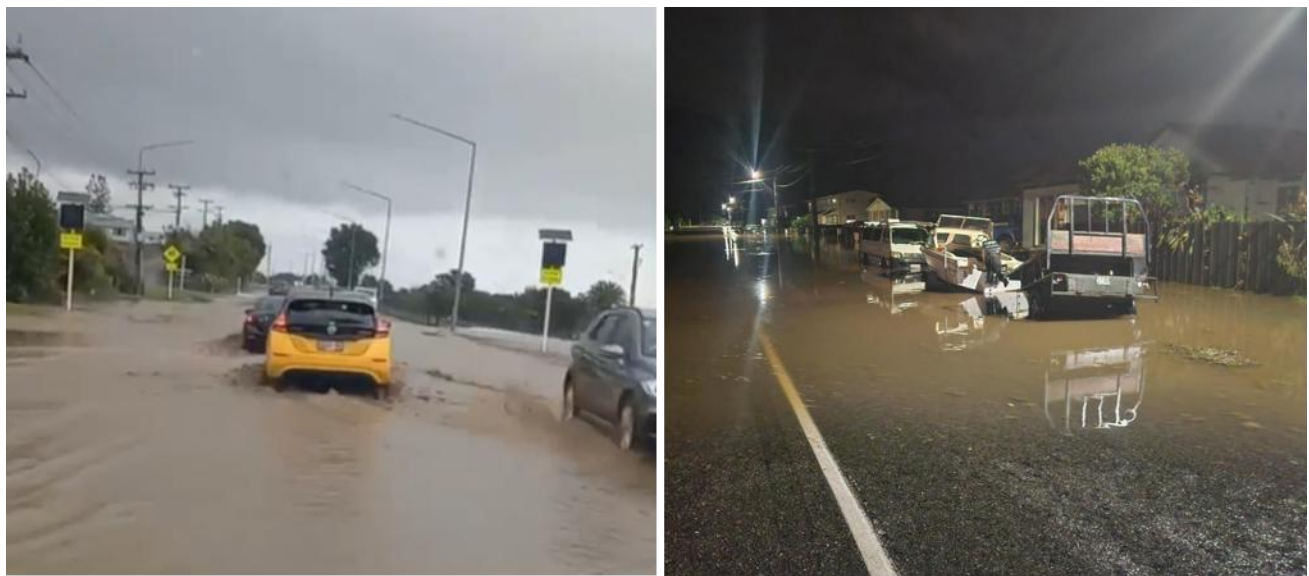


Figure 1: Left, flooding of SH6 at Karoro School on 15th July. Right, flooding at Cobden on 24 July

Available Data

Ground Based Data

Available rainfall-monitoring locations across the wider Greymouth area are presented in Figure 2. Within the urban area, two monitoring stations are operated by West Coast Regional Council (WCRC) at Paroa and Earth Sciences New Zealand (ESNZ) at Greymouth Aerodrome. These stations form part of established environmental monitoring networks designed to provide reliable, long-term rainfall records. These sites are routinely inspected and operated to National Environmental Monitoring Standards, with documented maintenance, calibration and data-validation processes.

Third-party observations were obtained from rain gauges operated by KiwiRail and Fire and Emergency New Zealand (FENZ), together with information supplied by Grey District Council (GDC) and a private gauge at Marsden Road. These third party observations improve the spatial coverage available for assessing the events, particularly where the most intense rainfall occurred between the environmental monitoring stations operated

by WCRC and ESNZ. These third party rainfall stations may have been installed for different operational purposes and are not necessarily subject to equivalent calibration, siting or check-gauge validation as WCRC and ESNZ gauges, and as such, their real-time telemetry has been treated as provisional. These records can subsequently be quality assured and incorporated into validated environmental datasets.

Based on the available metadata, the KiwiRail and FENZ observations are considered to provide useful, moderate-confidence evidence of event rainfall. The GDC/private observation should be treated as indicative as the gauge type, siting, logging interval and calibration are unknown. These supporting rainfall records should not be treated as equivalent to validated WCRC or ESNZ data; however, their consistency with radar imagery, reported flooding and observed creek responses provides some evidence that the WCRC/ESNZ rainfall monitoring network did not capture the highest rainfall intensities during either event.

Overall, the combined evidence demonstrates that the apparent differences between recorded gauge totals and observed flooding primarily reflect the highly localised spatial distribution of convective rainfall. Rain gauges provide accurate measurements at their individual locations, but weather radar and supplementary observations are required to interpret rainfall occurring between those locations.

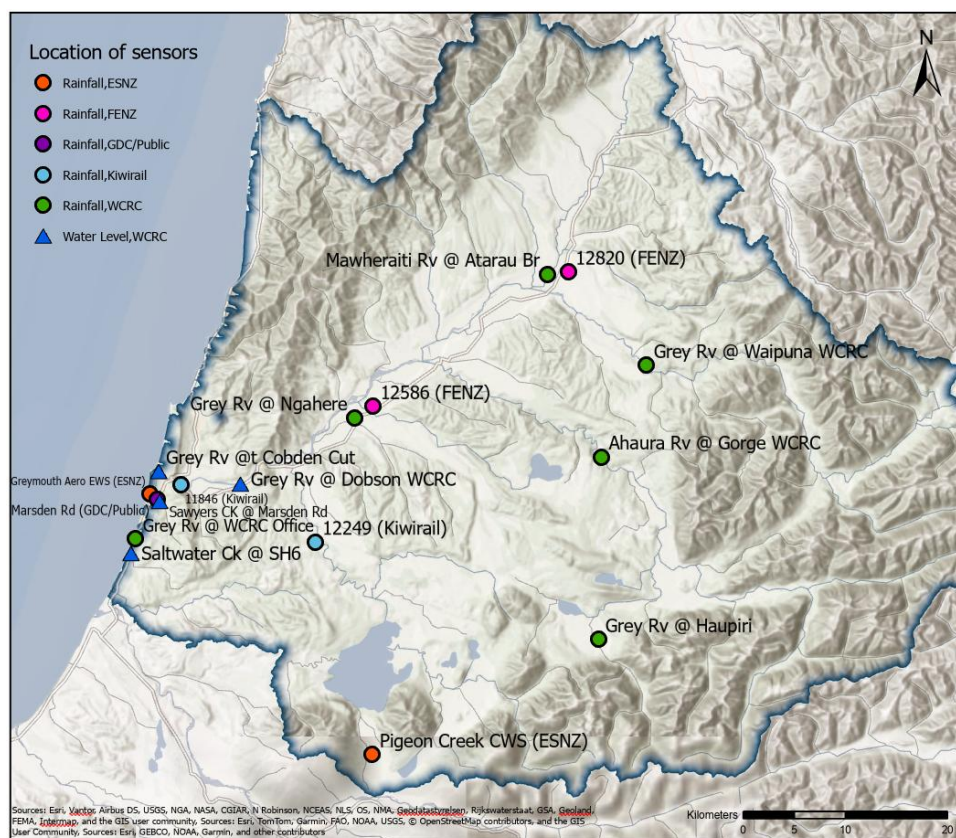


Figure 2: Rainfall and water-level monitoring locations across the Grey River catchment used in the event assessment.

MetService Rain Radar Data.

Gauge corrected weather radar data has also been acquired from MetService over the events in question. The radar imagery demonstrates the limitations of interpreting either event from rain gauges alone. On 15 July, the highest radar-derived rainfall intensities were concentrated within a narrow corridor crossing southern

Greymouth. Much of this corridor passed between, or only partially across, the WCRC and Greymouth Aerodrome gauges. The comparatively modest totals recorded at these stations therefore do not represent the maximum rainfall likely to have occurred within the affected Karoro and Sawyers Creek catchments.

The 24 July event had a broader rainfall footprint across Greymouth and the lower Grey catchment, with embedded areas of very high intensity. This wider distribution is consistent with elevated rainfall being recorded at a greater number of monitoring locations and with the strong, near-concurrent responses observed in Sawyers Creek and Saltwater Creek. The largest third party observations were recorded by gauges located closer to the intense radar rainfall core, including the KiwiRail network and the private Marsden Road gauge.

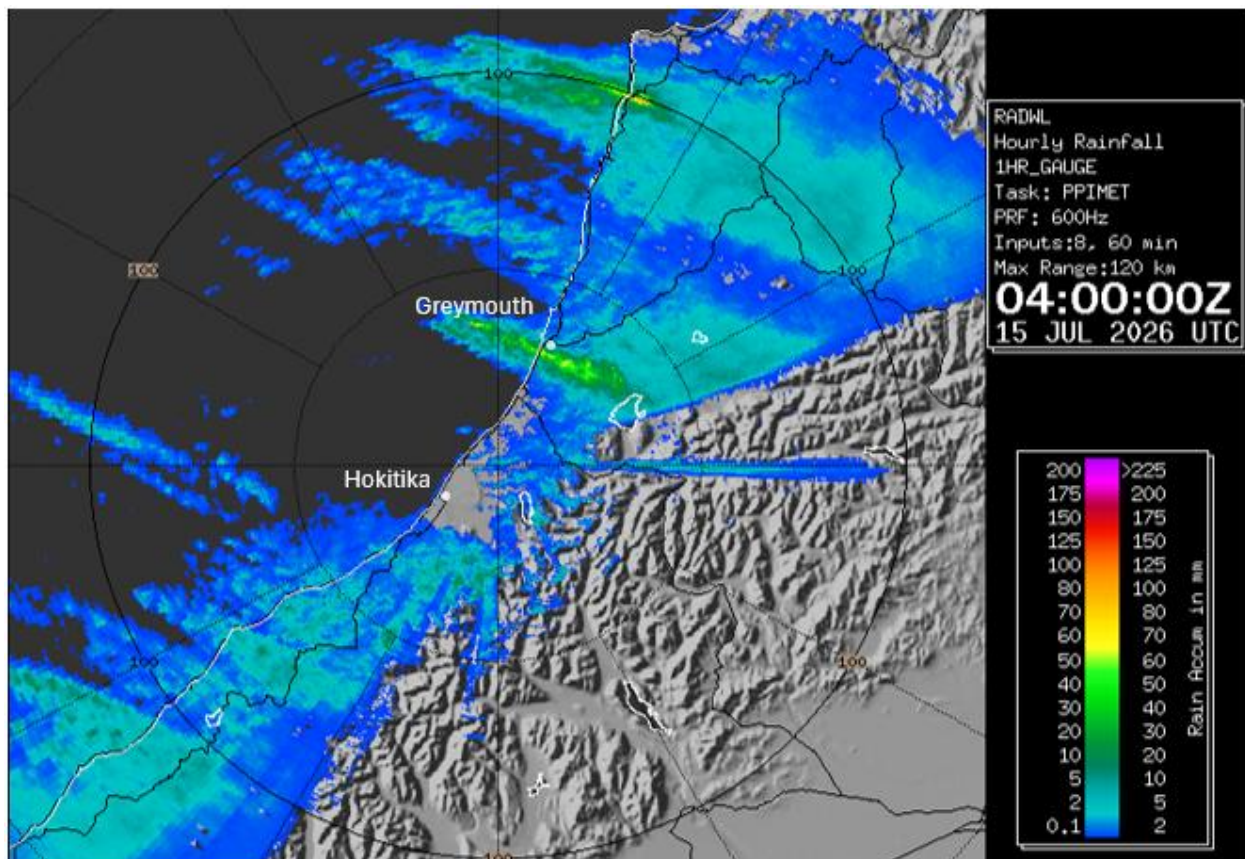


Figure 3: MetService gauge-corrected weather-radar data for the rainfall event on 15th. Notable is the very narrow band of high intensities, most of which was missed by rain gauges (note - UTC, Zulu Time)

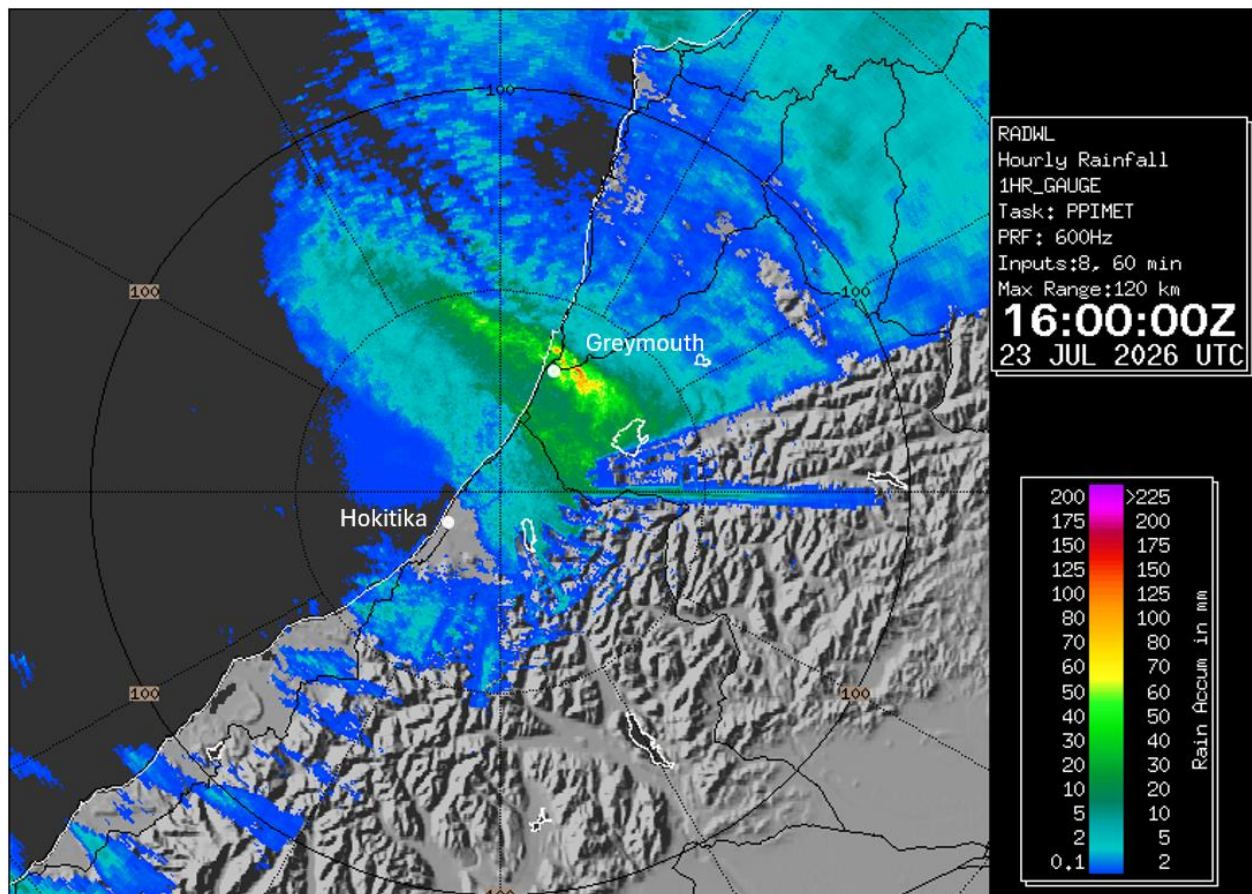


Figure 4: MetService gauge-corrected weather-radar data for the rainfall event on 24th. Notable is the very narrow band of high intensities. (note UTC Zulu Time).

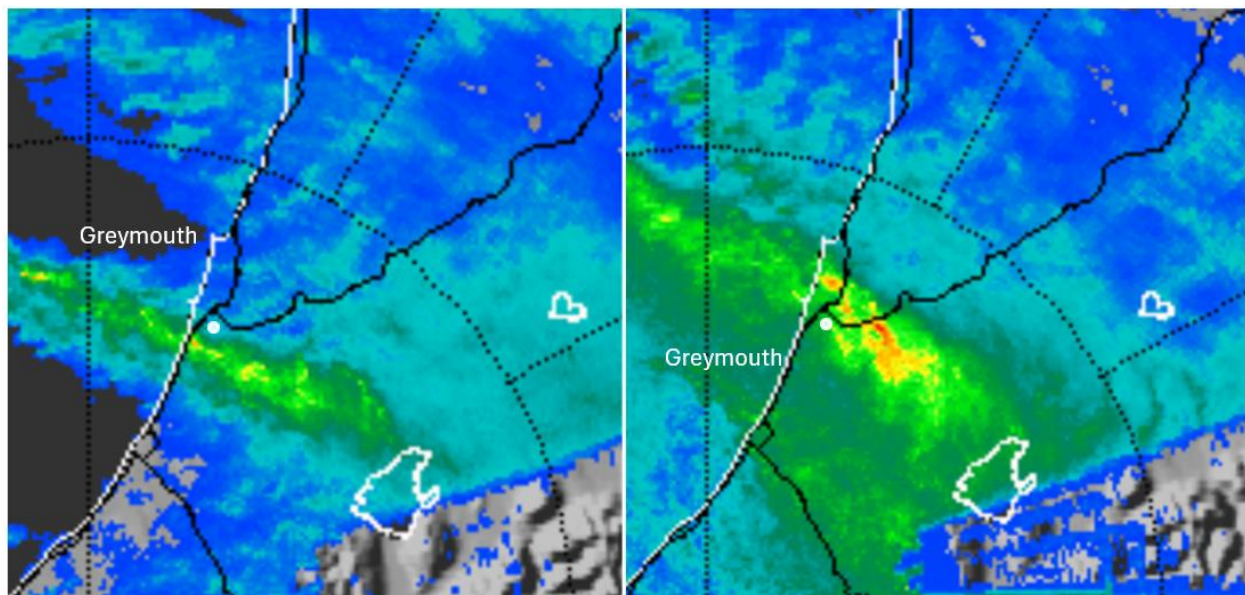


Figure 5: Thunderstorm bands over the peak of each event 15th (left) and 24th (right) (Figures 3 and 4).

Antecedent conditions

Rainfall recorded at Greymouth Airport and the WCRC Office indicates that July 2026 was characterised by intermittent rainfall separated by several relatively dry periods (rainfall below 1.5mm per day). Rainfall occurred during 4 - 7 July, followed by approximately a week of little rainfall before the 15 July thunderstorm. Further rainfall was recorded during 15 - 17 July, after which conditions were comparatively dry through much of the week preceding the second event.

As both events occurred during winter, evaporation and vegetation water use would have been relatively low. Soils, shallow groundwater systems and urban drainage networks were therefore likely to have retained some moisture from earlier rainfall. However, the available daily rainfall data do not demonstrate that the wider Grey catchment was continuously saturated before either event. The relatively dry intervals would have allowed some recovery of soil and drainage storage between rainfall periods.

Antecedent soil moisture was unlikely to have been the principal control on the observed surface flooding. The affected Greymouth stormwater catchments are small and respond quickly, with runoff generated from roofs, roads and other impervious surfaces, as well as from steep urban hillslopes draining toward low-lying areas. These surfaces provide little infiltration or temporary storage, meaning runoff can increase almost immediately when rainfall intensity exceeds the capacity of gutters, pipes, channels, culverts and pumps.

The preceding winter rainfall may have reduced available storage in pervious areas and contributed to runoff from hillslopes. However, the timing, rapid onset and localised distribution of flooding indicate that short-duration rainfall intensity and stormwater-system capacity were the dominant factors during both events.

Water levels recorded in Sawyers Creek and Saltwater Creek provide no indication that the monitored waterways were already at elevated levels prior to each event. Sawyers Creek was approximately 0.27 m before the main response, while Saltwater Creek was approximately 0.42 m. This suggests that the receiving channels retained some available capacity at the onset of the storm.

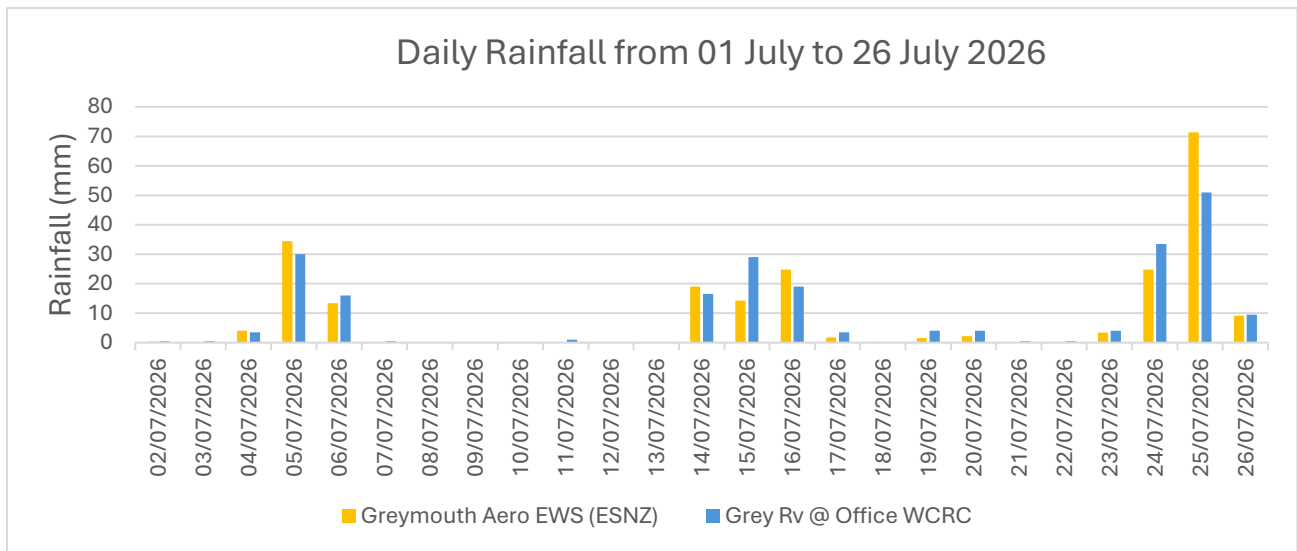


Figure 6: Summary of daily rainfall totals recorded from the start of July by WCRC and ESNZ rain gauges preceding the rainfall events on 15th and 24th July.

15 July 2026 event

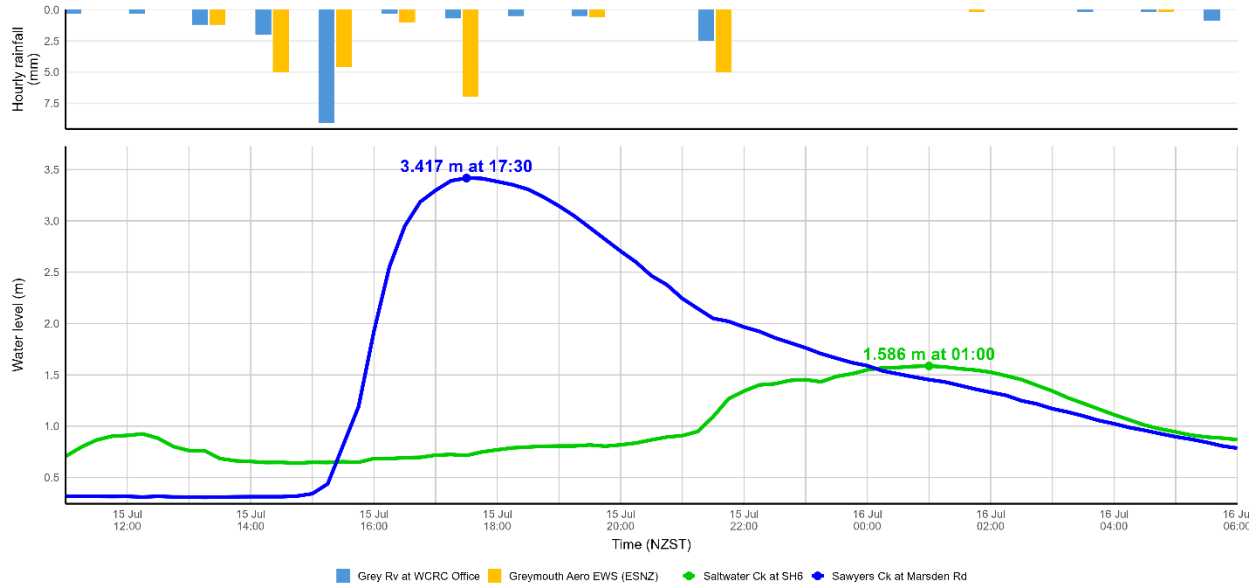


Figure 7: Water level for two local urban creeks and hourly rainfall for the 15 July 2026 event.

24 July 2026 event

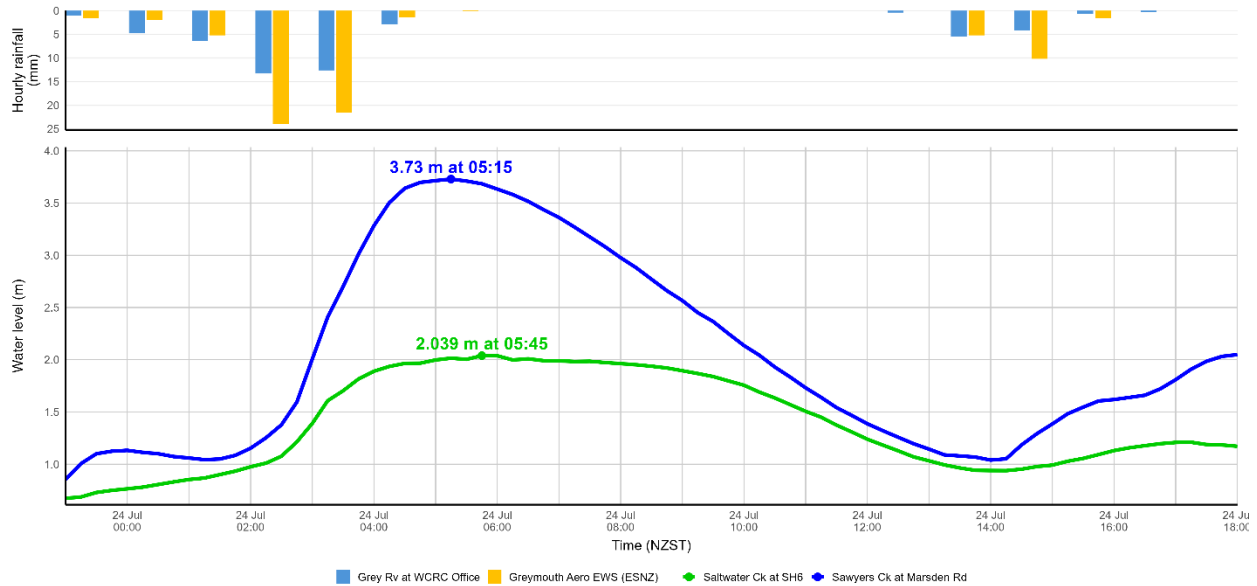


Figure 8: Water level for two local urban creeks and hourly rainfall for the 24th July 2026 event

Rainfall Observations

Comparative rainfall depths recorded over each event, over the 30min, 1 hour and 2 hour rainfall durations are presented in *Figure 9*, *Figure 10* and *Figure 11*. Values presented are discussed below, relative to the spatial distribution for each event.

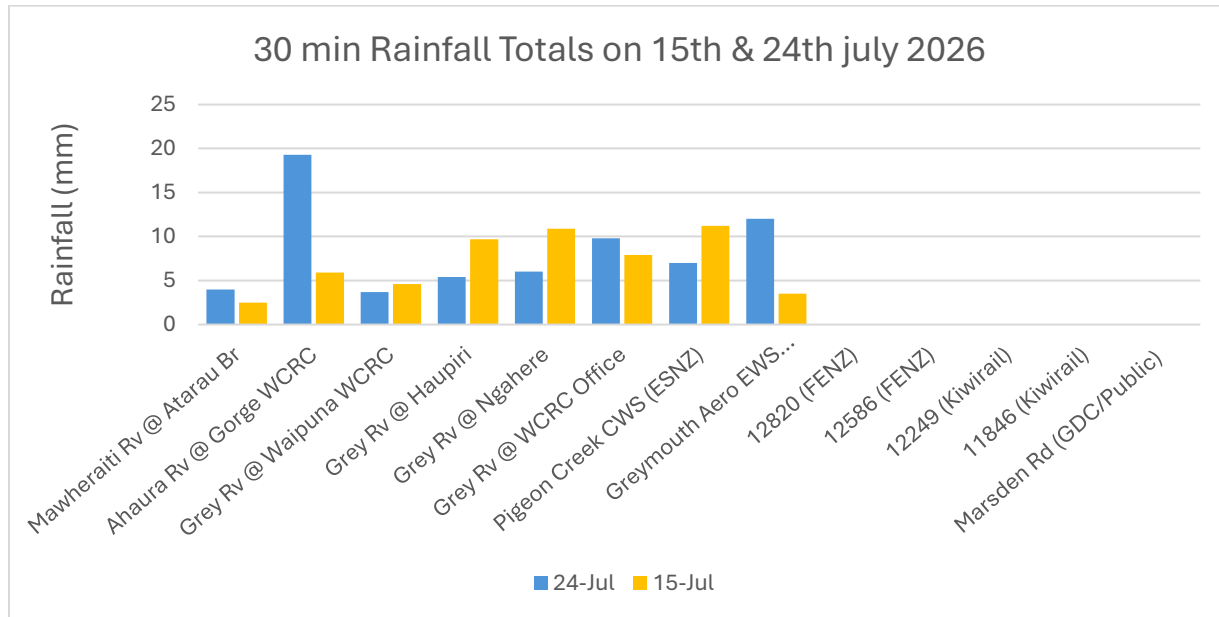


Figure 9: Summary of Maximum 30 min Rainfall totals recorded by available gauges during the flood events on the 15th and 24th July 2026.

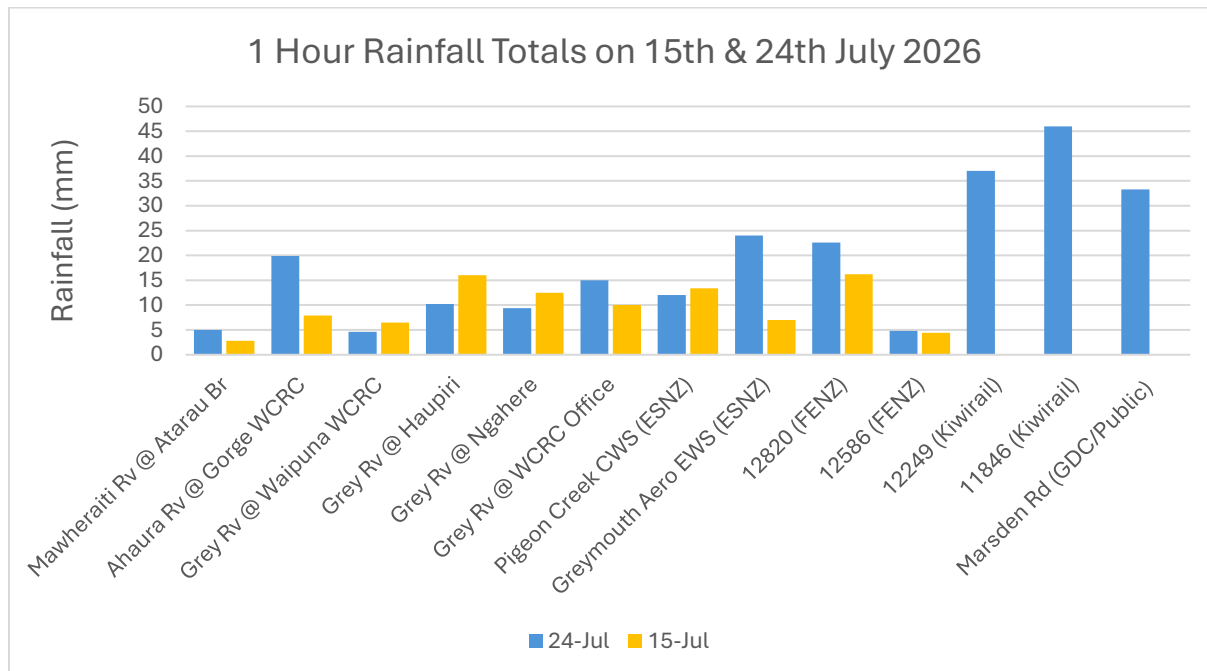


Figure 10: Summary of Maximum 1 hour Rainfall totals recorded by available gauges during the flood events on the 15th and 24th July 2026.

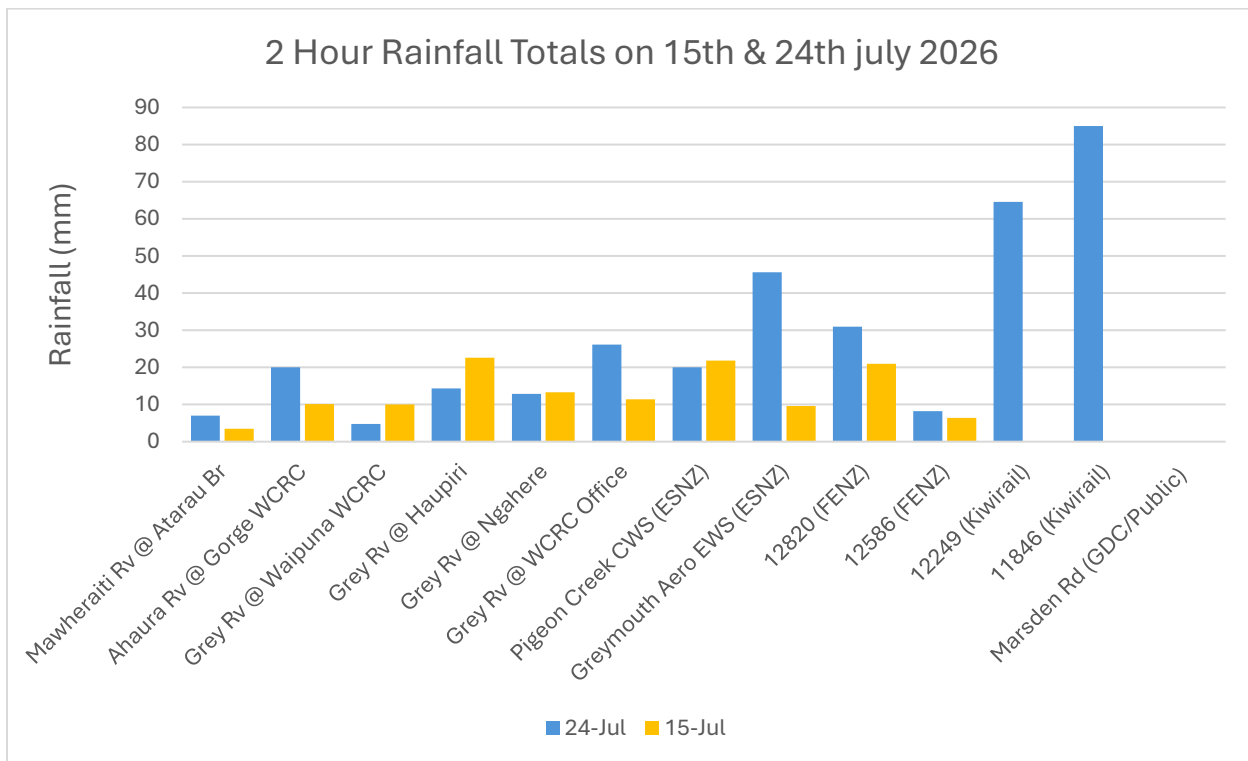


Figure 11: Summary of Maximum 2 hour Rainfall totals recorded by available gauges during the flood events on the 15th and 24th July 2026.

15th July 2026

Rainfall recorded during the 15 July event varied across the monitoring network (*Figure 12*). The highest one-hour totals were recorded at FENZ 12820 (16.2 mm), Grey River at Haupiri (16.0 mm), Pigeon Creek (13.4 mm) and Grey River at Ngahere (12.5 mm).

Over longer durations, the largest totals occurred at the inland Grey River sites. Haupiri recorded 38.4 mm over six hours, 50.1 mm over 12 hours and 56.5 mm over one day. By comparison, the one-day totals at Greymouth Aerodrome and the WCRC office were 24.8 mm and 19.0 mm respectively.

The one-hour rainfall graph shows relatively moderate variation between the available gauges, with recorded totals ranging from 2.8 mm at Mawheraiti River at Atarau Bridge to 16.2 mm at FENZ 12820. The corresponding radar image shows rainfall extending across the wider Grey catchment and coastal area during the observation period. The gauge results provide the measured rainfall depths at individual locations, while the radar image provides context on the spatial coverage of rainfall between those locations.

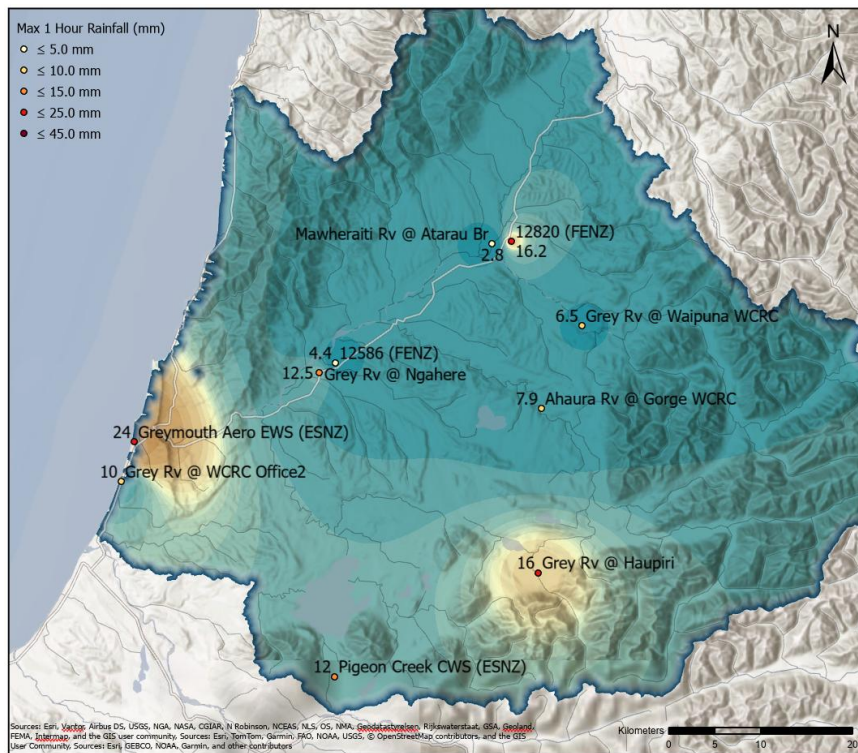


Figure 12: Map showing the spatial distribution of the 1 hour maximum rainfall totals recorded over the Grey Catchment during the 15th of July event.

24th July 2026

The 24 July event produced substantially greater short-duration rainfall totals at several gauges in and around Greymouth. The highest estimated one-hour total was approximately 46 mm at KiwiRail site 11846, followed by approximately 37 mm at KiwiRail site 12249 and 33.3 mm at Marsden Road.

The largest two- and six-hour totals were also reported at the two KiwiRail sites. Site 11846 recorded approximately 85 mm over two hours and 109.6 mm over six hours, while site 12249 recorded approximately 64.6 mm and 84 mm respectively. These values are based on visual checks of the supplied KiwiRail rainfall graphs and should therefore be treated as approximate. At the Greymouth Aerodrome gauge, 45.6 mm was recorded over two hours with the WCRC office recorded 26.1 mm and 43.3 mm over the 1 hour and 2 hour event durations.

Across the WCRC and ESNZ monitoring network, one-day totals ranged from 13.1 mm at Grey River at Waipuna to 79.2 mm at Greymouth Aerodrome. Other larger one-day totals included 73.5 mm at the WCRC office, 65.4 mm at Pigeon Creek and 49.3 mm at Haupiri. One-day totals were unavailable for the supplementary KiwiRail, FENZ and Marsden Road gauges.

The one-hour rainfall graph shows the highest recorded or estimated totals clustered at the KiwiRail and Marsden Road sites, followed by Greymouth Aerodrome and FENZ 12820 (Figure 13). Lower one-hour totals were recorded at the more distant Grey catchment sites, including Waipuna, Atarau Bridge, Ngahere and Haupiri. The corresponding radar image displays areas of higher rainfall intensity over and near Greymouth during the observation period, alongside rainfall of varying intensity across the surrounding area.

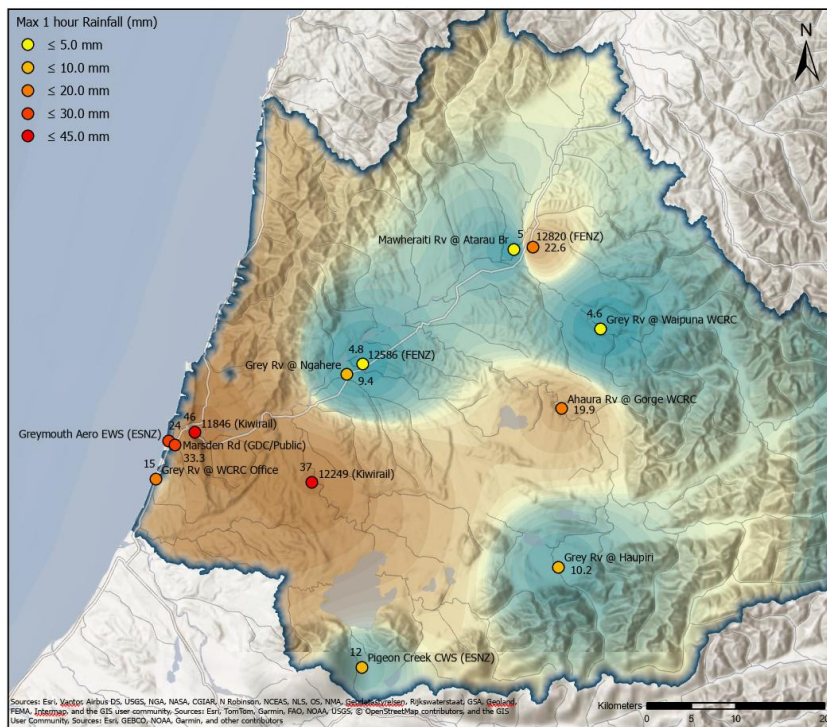


Figure 13: Map showing the spatial distribution of the 1 hour maximum rainfall totals recorded over the Grey Catchment during the 24th of July event .

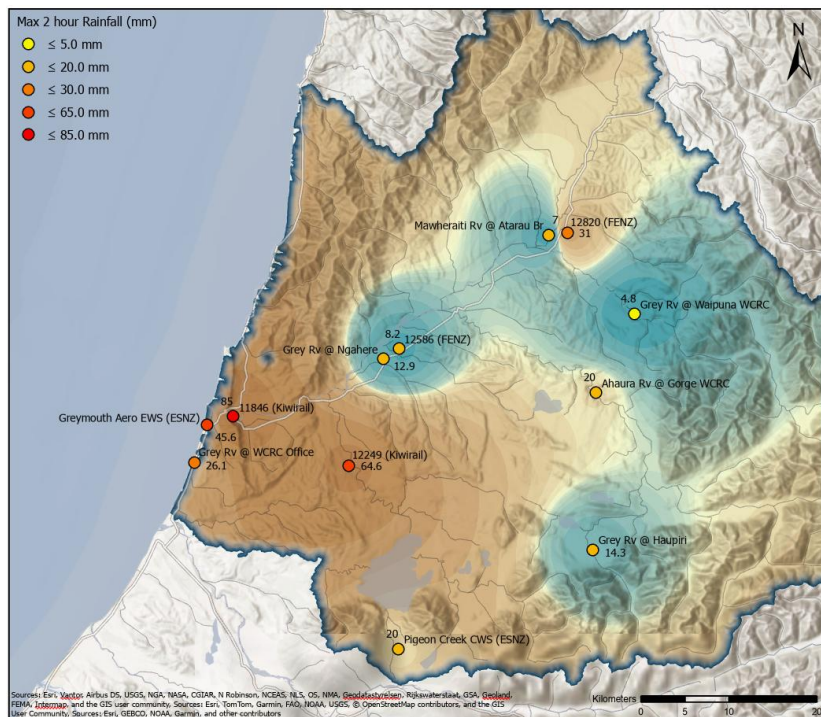


Figure 14: Map showing the spatial distribution of the 2 hour maximum rainfall totals recorded over the Grey Catchment during the 24th of July event .

Comparison

Maximum two hour rainfall totals differed markedly between the two events. At Greymouth Aerodrome, the recorded maximum increased from 24 mm on 15 July to 45.6 mm on 24 July. At the WCRC office, the corresponding totals increased from 11.4 mm to 26.1 mm, while FENZ 12820 recorded 21.0 mm and 31.0 mm respectively.

The largest two-hour totals on 24 July were observed at the supplementary KiwiRail gauges: approximately 64.6 mm at site 12249 and 85 mm at site 11846. No comparable KiwiRail data were available for the 15 July event. At several inland gauges, including Haupiri, Waipuna and Pigeon Creek, the two-hour total recorded on 15 July was similar to or greater than that recorded on 24 July.

Meteorological Setting

Both events were dominated by convective rainfall rather than prolonged, spatially uniform rainfall. Convective storms develop where unstable air allows strong vertical cloud growth, producing thunderstorms capable of intense rainfall, lightning, hail and localised wind gusts. Individual storm cells may be only a few kilometres wide and can develop, intensify and weaken rapidly. Consequently, rainfall can vary substantially over short distances.

During the afternoon of 15 July, MetService weather radar identified a narrow, high-intensity thunderstorm cell crossing southern Greymouth. A Severe Thunderstorm Warning was issued for Grey and Westland at approximately 3:15 pm. The cell subsequently moved inland and weakened, and the warning was lifted at approximately 3:55 pm. Radar imagery indicates that the most intense rainfall followed a confined corridor across southern Greymouth, largely between the WCRC and ESNZ rainfall gauges.

The 24 July event occurred during the early morning and had a broader rainfall footprint. Radar imagery shows a wider area of moderate to heavy rainfall across Greymouth and the lower Grey catchment, containing embedded areas of higher-intensity convective rainfall. This resulted in more rainfall gauges recording elevated totals than during the 15 July event, although substantial variation remained between nearby monitoring locations.

The localised and rapidly evolving nature of both storms limited the ability to forecast their precise location, timing and intensity in advance. Forecasts and thunderstorm outlooks can identify an environment favourable for convection, but the location of the most intense rainfall may remain uncertain until individual cells develop. Once this occurs, weather radar, lightning observations and real-time rainfall and water-level data become important for tracking storm movement and assessing emerging impacts.

Large-scale climate setting

The July 2026 events occurred during a period of transition in the El Niño–Southern Oscillation (ENSO). By early July, Earth Sciences New Zealand (ESNZ) considered El Niño conditions to have developed in the tropical Pacific, although the event remained in its early stages and its influence on New Zealand weather patterns was expected to become more apparent later in winter and spring.

The July–September 2026 seasonal outlook indicated an expected transition towards more westerly airflow as El Niño strengthened, with rainfall most likely to be above normal in the west of the South Island. This

represented a change from the preceding climate state, with La Niña patterns having weakened earlier in 2026 and the tropical Pacific transitioning rapidly through neutral conditions towards El Niño.

ENSO influences broad-scale atmospheric circulation and seasonal rainfall patterns but does not determine the occurrence or location of individual thunderstorms. While higher sea surface temperatures in the Pacific Ocean increase the risk of high intensity rainfalls, the available information does not establish that the 15 or 24 July events were caused by the developing El Niño, or that their occurrence indicates an increase in the frequency of convective storms. The events are more appropriately interpreted as short-duration convective storms occurring within a developing El Niño background climate state.

Other large-scale climate drivers were also evolving during this period. The Southern Annular Mode (SAM) had been frequently positive during June but was forecast to be near neutral in early July, while the Madden-Julian Oscillation (MJO) was active in the western Pacific during the transition towards El Niño. These climate modes can influence New Zealand's broader weather patterns but, as with ENSO, do not provide a basis for attributing the two Greymouth events to a particular climate driver.

Frequency Analysis

Rainfall data collected from recorded rainfall across the Greymouth area for the 24th July 2026 are presented in Table 3. Rainfall totals observed during the 15th of July event did not reach any return period threshold and so have not been displayed. These totals over a range of event durations have been compared with High Intensity Design Rainfall data provided by ESNZ.

Observed data has been compared with the HIRDSv4 estimates at each site location and indicates that the event significance was highly variable across the wider Greymouth area. At WCRC and ESNZ monitoring sites, the recorded rainfall was relatively common, generally below a 2 year ARI, with the exception of Ahaura River at Gorge recorded approximately a 5-year rainfall over 10 minutes and between approximately 5 and 10 years over 20 minutes. Within a more localised setting, Greymouth Aerodrome recorded approximately a 5-year ARI rainfall depth over two hours, while its one- and six-hour totals were closer to a 2-year ARI. Rainfall recorded at the WCRC office was below a 2-year ARI across the assessed durations.

The third party gauge data indicate that a substantially more intense and spatially concentrated rainfall core occurred within the urban area. At KiwiRail site 12249, the approximate rainfall totals correspond to ARIs of around 10 years over one hour, 20 to 30 years over two hours, and 5 - 10 years over six hours. At KiwiRail site 11846, the one-hour total was approximately equivalent to a 10 to 20-year ARI, with the approximate two-hour rainfall being between the HIRDSv4 80- and 100-year ARI estimates. Over the longer duration the six-hour total was approximately equivalent to a 10 - 20-year ARI. The Marsden Road observation was approximately equivalent to a 5 year ARI over one hour.

These results indicate that the most unusual feature of the event was the rainfall accumulated over approximately two hours near KiwiRail site 11846. The lower ARIs at both shorter and longer durations suggest that the event contained a particularly intense two-hour rainfall burst, rather than an exceptionally large rainfall accumulation throughout the wider six-hour period. The marked differences between nearby gauges are consistent with the localised rainfall distribution shown by the weather radar.

It would therefore be misleading to describe the event generally as an 80 year storm. ARI applies to a particular rainfall depth, duration and location. A more appropriate description is that a locally exceptional two-hour

rainfall total approximately equivalent to an 80-year HIRDSv4 estimate, occurred within a broader event that was generally of low to moderate rarity across the WCRC and ESNZ monitoring network. An 80-year ARI is equivalent to approximately a 1.25% chance of exceedance in any year; it does not mean that such rainfall occurs regularly once every 80 years.

Table 3: Rainfall intensities and totals recorded on 24th July 2026 in the Grey catchment and their annual return intervals (ARI).

Agency	Site	10min	20min	30min	1hour	2hour	6hour	12hour	1day
WCRC	Mawheraiti Rv @ Atarau Br	2.7	3	4	5	7	11.5	16	17
WCRC	Ahaura Rv @ Gorge	13.9	19.3	19.3	19.9	20	21	28.1	44.3
WCRC	Grey Rv @ Waipuna	1.6	2.7	3.7	4.6	4.8	9	12	13.1
WCRC	Grey Rv @ Haupiri	2.6	3.6	5.4	10.2	14.3	33.9	44.3	49.3
WCRC	Grey Rv @ Ngahere	2.8	4.5	6	9.4	12.9	26.5	36.8	37.5
WCRC	Grey Rv @ WCRC Office	6.6	8.2	9.8	15	26.1	43.3	52.5	73.5
ESNZ	Pigeon Creek CWS	2.4	4.8	7	12	20	42	55.8	65.4
ESNZ	Greymouth Aero EWS	4	8	12	24	45.6	64.8	72.2	79.2
Kiwirail*	12249	NA	NA	NA	~37	~64.6	~84	NA	NA
Kiwirail*	11846	NA	NA	NA	~46	~85	~109.6	NA	NA
FENZ	12820	NA	NA	NA	22.6	31	49.8	NA	NA
FENZ	12586	NA	NA	NA	4.8	8.2	19.2	NA	NA
GDC/Public	Marsden Rd	NA	NA	NA	33.3	NA	NA	NA	NA

ARI (years)	2.0 / 2.33	5	10	20	80	100	200+
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Hydrological Response

The two rainfall events produced distinctly hydrological responses across the urbanised monitoring network. Sawyers Creek, Saltwater Creek and Cobden Cut responded rapidly to both events, demonstrating the responsiveness of Greymouth's small urban waterways to short-duration rainfall as their smaller catchment with higher proportional impervious areas have shorter times for maximum concentration of run-off to occur. All three urban monitoring sites recorded higher peak levels during the 24 July event. However, the initial rise in Sawyers Creek was steeper during the 15 July event, despite its peak level being lower.

In contrast, the Grey River at Dobson recorded only modest responses to both events. The river reached a slightly higher peak following the 15 July event, when it recorded 1,047 m³/s, compared with 986 m³/s on 24 July. Both flows had estimated return periods of less than one year. This contrasting response is consistent with rainfall being concentrated over relatively small urban catchments, producing rapid local runoff but having limited influence on flow across the much larger Grey River catchment.

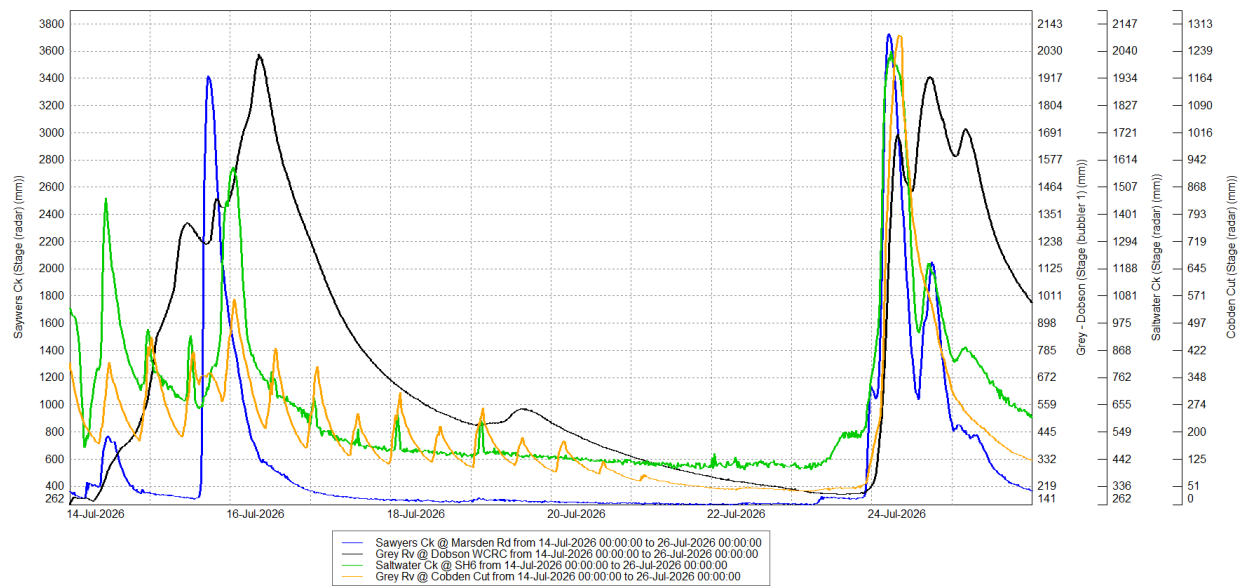


Figure 15: Plots of water level responses over both events at monitoring locations around Greymouth and for the Grey River at Dobson.

15th July 2026

The most pronounced urban-stream response occurred at Sawyers Creek at Marsden Road. The recorded level increased from approximately 313 mm to a peak of 3,417 mm at 5:30 pm, representing a rise of approximately 3.1 m in about two hours. This was the steepest initial rise observed in Sawyers Creek during the two events.

Saltwater Creek responded more gradually and reached a peak of 1,586 mm at approximately 1:00 am on 16 July. Cobden Cut reached 562 mm shortly afterward, at approximately 1:09 am. The later timing of these peaks, together with the tidal influence at both sites, means that their responses are not directly comparable with the rapid rise recorded in Sawyers Creek.

The Grey River at Dobson reached a peak level of 2,017 mm and a peak flow of 1,047 m³/s at 8:35 am on 16 July. This flow had an estimated return period of less than one year, indicating that the event produced only a minor response in the main river.

Table 4: Peak River and Creek flows recorded in the Greymouth area on the 15th July 2026.

Monitoring site	Date and time of peak	Peak level (mm)	Peak flow (m ³ /s)	Return period	Record (years)
Grey Rv at Dobson	16/07/2026 08:35	2017	1047	<1.0	56
*Sawyers Ck	15/07/2026 17:30	3417	NA	NA	<5
**Cobden Cut	16/07/2026 01:09	562	NA	NA	<10
**Saltwater Ck	16/07/2026 01:00	1586	NA	NA	<5

* Less than 5 years of data, no flow data available.

** Tidal influence, no flow data available.

24 July 2026

The second event produced higher peak levels at all three monitored urban waterways. Sawyers Creek reached 3,730 mm at 5:15 am on 24 July, approximately 313 mm higher than during the first event. Although the peak was higher, its initial rate of rise was shallower than that observed on 15 July.

Saltwater Creek reached 2,039 mm at 5:45 am, approximately 453 mm higher than its 15 July peak. Cobden Cut reached 1,283 mm at 8:09 am, approximately 721 mm higher than during the earlier event. Because Saltwater Creek and Cobden Cut are tidally influenced, some of the difference between the recorded peaks may reflect tidal conditions in addition to storm runoff. During this event all three sites experienced steeply rising limbs in comparison to the 15th July event where only Sawyers Creek had a steep rise.

Despite the stronger responses in the urban waterways, the Grey River at Dobson remained relatively subdued. It reached a peak level of 1,923 mm and a peak flow of 986 m³/s at 5:15 pm on 24 July. This was 61 m³/s lower than the peak following the 15 July event and again corresponded to an estimated return period of less than one year.

Table 5: Peak River and Creek flows recorded in the Greymouth area on the 24th July 2026.

Monitoring site	Date and time of peak	Peak level (mm)	Peak flow (m ³ /s)	Return period	Record (years)
Grey Rv at Dobson	24/07/2026 17:15	1923	986	<1.0	56
*Sawyers Ck	24/07/2026 05:15	3730	NA	NA	<5
**Cobden Cut	24/07/2026 08:09	1283	NA	NA	<10
**Saltwater Ck	24/07/2026 05:45	2039	NA	NA	<5

* Less than 5 years of data, no flow data available.

** Tidal influence, no flow data available.

Discussion

The tabulated data show clear differences between the two events. During the 15 July event, the highest one-hour totals were between approximately 13 mm and 16 mm and were distributed among several coastal and inland sites. During the 24 July event, one-hour totals exceeded 30 mm at three supplementary gauges near Greymouth and reached approximately 46 mm at KiwiRail site 11846.

The available observations therefore describe two rainfall events with different measured distributions. The 15 July event recorded its larger accumulations across several parts of the wider Grey catchment, particularly over the longer durations. The 24 July data contain much higher short-duration totals at gauges located within or close to Greymouth which corresponds with the steep rising limbs of all three urban water level sites monitored. Interpretation of the atmospheric causes, representativeness of individual gauges, rainfall rarity and resulting effects is addressed separately.

The 24 July event illustrates the forecasting challenge presented by localised convection. The broader potential for thunderstorms may be forecast in advance, but the location of the most intense rainfall and resulting urban

impacts may become apparent only as individual cells develop. Short-duration radar updates, supplementary rainfall observations and urban stream monitoring are therefore central to operational situational awareness.

Historical context and significance

HIRDSv4 provides the most consistent nationally available basis for comparing the observed rainfall with historical design-rainfall estimates. On this basis, the approximate two-hour rainfall of 85 mm at KiwiRail site 11846 was between the HIRDSv4 80 and 100-year ARI estimates for that location. This indicates that the rainfall was locally exceptional when compared with the HIRDSv4 historical baseline.

However, this result should not be interpreted as meaning that Greymouth experienced an 80 to 100-year storm. The estimated rarity applies to one rainfall duration at one supplementary monitoring location. Rainfall recorded at most third party gauges was considerably more common, demonstrating that the event contained a highly localised rainfall core rather than uniformly exceptional rainfall across Greymouth or the wider Grey catchment. The rain radar data and contrasting hydrological responses reinforce this interpretation.

The 80 to 100-year comparison should be understood as an approximate equivalence to the HIRDSv4 historical estimates, rather than a precise estimate of the event's probability under the present climate. The true present-day probability may differ because the HIRDSv4 observational dataset generally ends in 2015–2016, rare return periods require substantial statistical extrapolation, and the supplementary KiwiRail rainfall observations remain provisional.

A comparison between the HIRDSv4 1-hour and 2-hour design rainfall estimates, and design rainfall estimates calculated from the Greymouth Aero (ESNZ) and Grey River at Office rainfall records, updated to the 2025–26 hydrological year, showed similar results. The updated estimates were lower (<10%) than the corresponding HIRDSv4 values at 2-5 year ARI. For the 1-hour duration, differences became more apparent (10-20%) during less frequent events, while the 2-hour duration estimates showed a more consistent relationship with HIRDSv4 across all event frequencies.

If the magnitude of high-intensity rainfall increases over time, rainfall depths similar to those observed during these events may become more frequent and therefore have shorter return periods. This has important implications for infrastructure design standards, particularly for urban stormwater systems.

Historical Events

To provide context, a review of available rainfall records, supplemented by historical media reports of significant flooding events, identified several examples of high short-duration rainfall intensities in the Greymouth area. However, the number of well-documented events available for comparison is limited. Long-term 2-hour moving total rainfall records are available for both the Greymouth Aero EWS and the Grey River at WCRC Office², providing a basis for assessing recent rainfall against historical intensities (*Figure 16 and Figure 17*).

The 11 January 2018 event recorded some of the higher 2-hour rainfall intensities in the Greymouth Aero record, with a total of 73.9 mm, alongside 59.8 mm recorded at the WCRC Office site. These totals are broadly comparable to the 85 mm recorded at the KiwiRail site during the recent event. However, the 2018 event was associated with a broader and longer-duration weather system, with rainfall affecting a wider area over an extended period, rather than representing the same highly localised short-duration rainfall pattern observed during the recent event. The event nevertheless resulted in significant surface flooding impacts across

Greymouth and provides useful context for the magnitude of short-duration rainfall that has occurred historically.

The April 2009 event provides a closer comparison in terms of rainfall duration, occurring over a short period of approximately 1.5 hours. The Greymouth Aero site recorded a 2-hour total of 51.6 mm, while the Office site recorded only 23.0 mm over the same period. This difference is notably larger than that seen during the 2018 event, and points to the localised nature and spatial variability of short-duration rainfall in the area, consistent with the pattern observed during the recent event. Media reporting from the time describes the rainfall as an intense downpour lasting approximately 90 minutes, associated with a slow-moving front over Westland that also brought heavy rain to Buller and further north, indicating that while the broader weather system affected a wider area of the West Coast, the most intense rainfall in Greymouth itself was concentrated within a short, sharp burst. These examples demonstrate that high short-duration rainfall intensities have occurred previously in Greymouth, while also highlighting the value of further review of historical rainfall records and event information to better understand the frequency and characteristics of these localised intense rainfall events.

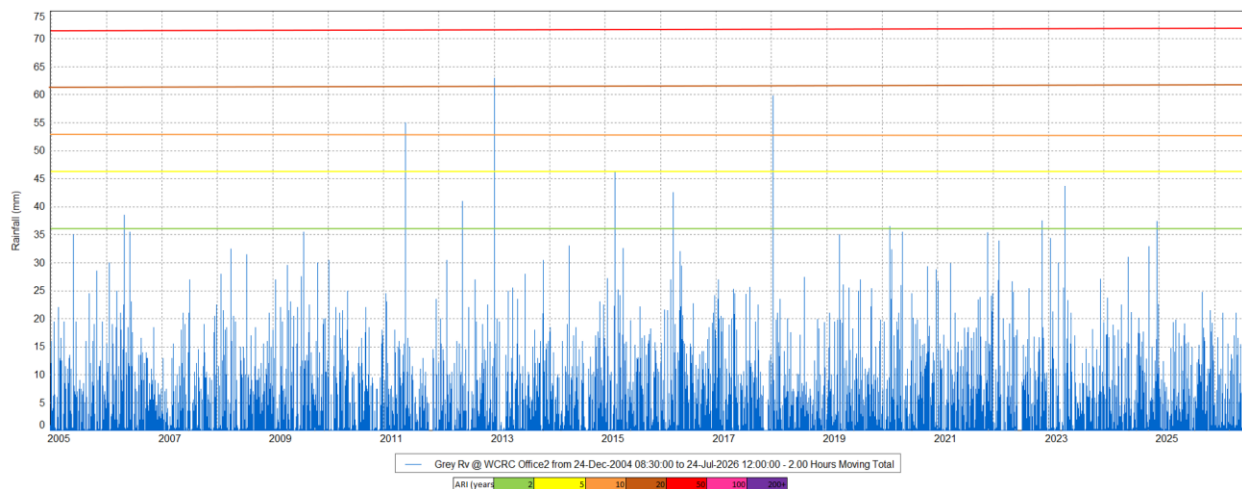


Figure 16: Historical 2-hour rainfall totals at Grey River at Office (2005–2026) compared with HIRDSv4 annual exceedance probability thresholds.

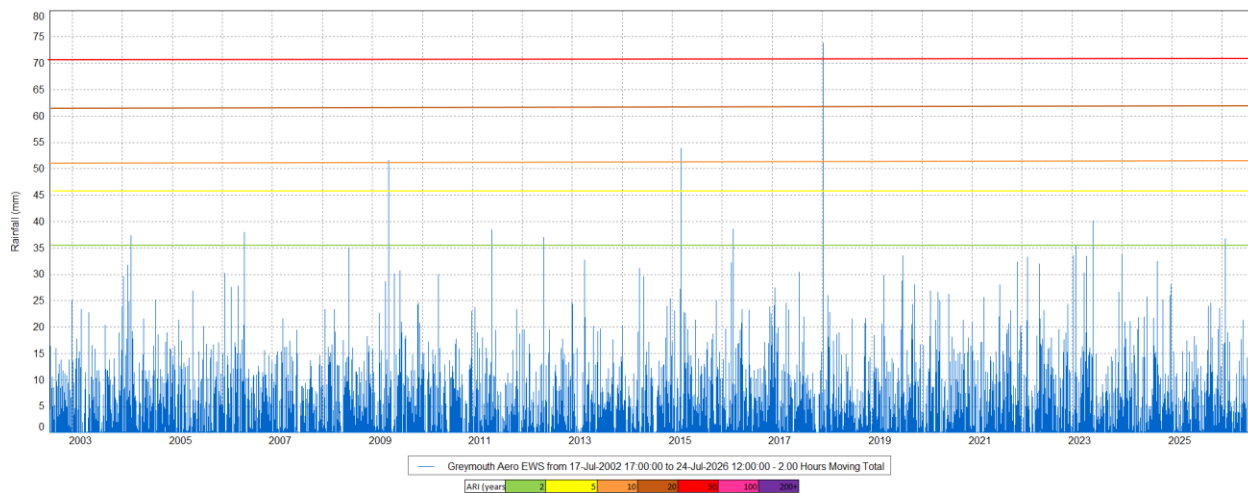


Figure 17: Historical 2-hour rainfall totals at Greymouth Aero EWS (ESNZ) (2002–2026) compared with HIRDSv4 annual exceedance probability thresholds

Limitations

Return Period Analysis – HIRDSv4

The High Intensity Rainfall Design System (HIRDSv4) is a national rainfall-frequency tool developed by Earth Sciences New Zealand (formerly NIWA), based off earlier works by Tomlinson (1980) and Coulter and Hessel (1980). It provides estimates of rainfall depth or intensity for different storm durations and annual recurrence intervals (ARIs) throughout New Zealand. HIRDSv4 is principally intended to provide design-rainfall estimates at locations where sufficiently long rainfall records are unavailable and is currently in its fourth iteration (Carey-Smith *et al.* (2018). The underlying observational dataset recorded across the national gauge network over the past eight years have not been included. This limits the representation of recent short-duration rainfall extremes; however, the available information does not by itself establish a sustained national increase in thunderstorm frequency (AMI, 2022).

Rain Gauge Data

The results from the supplementary KiwiRail, FENZ, GDC and private gauges should be treated as provisional until their metadata, calibration, timing and data-processing methods have been confirmed. Unlike the WCRC and ESNZ monitoring stations, these gauges may not be supported by routine check-gauge observations or established environmental-data quality-assurance procedures. Radar imagery provides valuable evidence of the storm's spatial distribution but does not, by itself, provide the same level of quantitative accuracy as a well-maintained ground gauge.

Conclusion

The rainfall events of 15 and 24 July 2026 demonstrate the sensitivity of Greymouth's small urban and foothill catchments to short-duration convective rainfall. Both events produced rapid responses in Sawyers Creek, Saltwater Creek and Cobden Cut, while the Grey River at Dobson remained relatively subdued. This

contrasting response indicates that the observed flooding was generated primarily within local catchments rather than by widespread flooding across the wider Grey River catchment.

Weather-radar imagery supports this. During both events, the highest rainfall intensities were concentrated in relatively narrow and rapidly evolving convective bands over or near Greymouth. On 15 July, the most intense radar-observed rainfall crossed southern Greymouth within a confined corridor that passed between, or only partly across, the rainfall gauges. On 24 July, radar showed a broader area of rainfall containing an embedded high-intensity core over the urban area. This spatial pattern is consistent with the higher rainfall recorded by the supplementary Greymouth gauges and the pronounced response of the urban waterways.

The radar imagery also shows that intense rainfall was not distributed uniformly across the wider Grey River catchment. This explains why small urban waterways responded rapidly while the Grey River at Dobson recorded only modest flows. It also demonstrates why rainfall recorded at an individual gauge may not adequately represent conditions within a nearby urban catchment during a convective storm.

The 24 July event was the more significant of the two events. An approximate two-hour total of 85 mm at KiwiRail site 11846 was between the HIRDSv4 80 and 100-year ARI estimates for that duration and location. However, rainfall recorded at most WCRC and ESNZ gauges was considerably more common, confirming that the exceptional rainfall core was highly localised.

The principal findings from this study are:

- Radar imagery and supplementary rainfall observations provide consistent evidence that the most intense rainfall was concentrated over relatively small areas within and around Greymouth.
- The 24 July event produced higher peak levels in all three monitored urban waterways and more extensive flooding across Greymouth and surrounding settlements.
- The 24 July event should not be described generally as an 80 to 100-year storm. That approximate rarity applies only to the two-hour rainfall recorded at one supplementary gauge within the localised rainfall band.
- The 15 July event produced lower recorded rainfall totals and waterway peaks but caused the steepest initial rise in Sawyers Creek. Radar indicates that the most intense part of this storm may not have been directly captured by the WCRC and ESNZ gauge network.
- The combination of localised radar-observed rainfall, rapid urban-waterway responses and minor Grey River flows confirms that the principal flood hazard arose from local stormwater and small-catchment runoff.
- Recorded levels at Saltwater Creek and Cobden Cut were influenced by catchment runoff, downstream conditions and tide and should not be interpreted solely as rainfall-runoff responses.
- To provide context, a review of historical records confirm that high-intensity, short-duration rainfall has occurred previously in Greymouth, including notable events in 2009 and 2018. These events also demonstrate the strong spatial variability of local rainfall and the limitations of relying on individual gauges to characterise convective storms.

- Site-specific frequency analyses using rainfall records updated to 2025 - 26 produced design-rainfall estimates broadly consistent with HIRDSv4. Although the updated estimates were generally lower (<10%), the comparison indicates that using HIRDSv4 did not materially alter the assessment of the July 2026 event's rarity; however, HIRDSv4-derived ARIs should remain approximate, particularly for rare events.

The events occurred during the early stages of a developing El Niño, with broader climate conditions transitioning towards the more westerly circulation patterns typically associated with El Niño in New Zealand. While this provides relevant context for the prevailing climate state, and warmer sea surface temperatures in the Pacific increase the risk of high intensity rainfall, the available evidence does not establish that El Niño caused either event. Similarly, the historical record considered in this assessment is insufficient to determine whether localised high-intensity rainfall events in Greymouth are becoming more frequent. Establishing such a trend would require a dedicated analysis of long-term short-duration rainfall records. HIRDSv4 remains a useful historical benchmark, however, the resulting ARIs should be treated as approximate due to the age of the underlying observational dataset, the statistical uncertainty associated with rare return periods and the provisional nature of some supplementary rainfall observations. The events demonstrate the value of integrating weather radar, ground-based rainfall observations and real-time urban water-level monitoring to improve situational awareness and provide earlier indication of emerging flood impacts.

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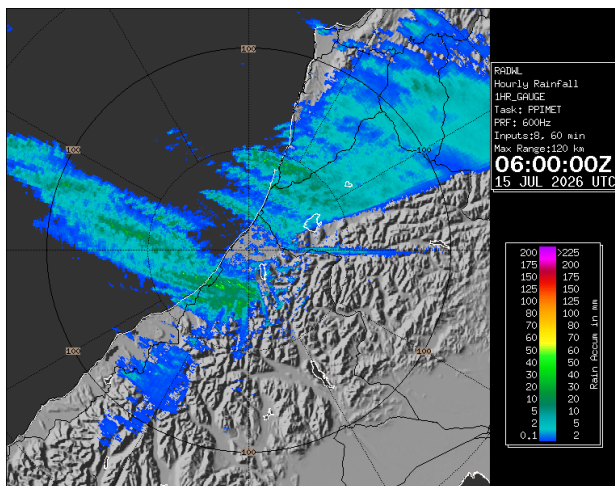
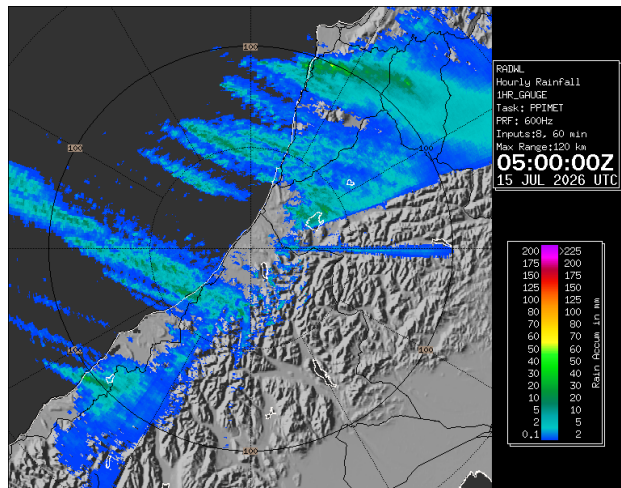
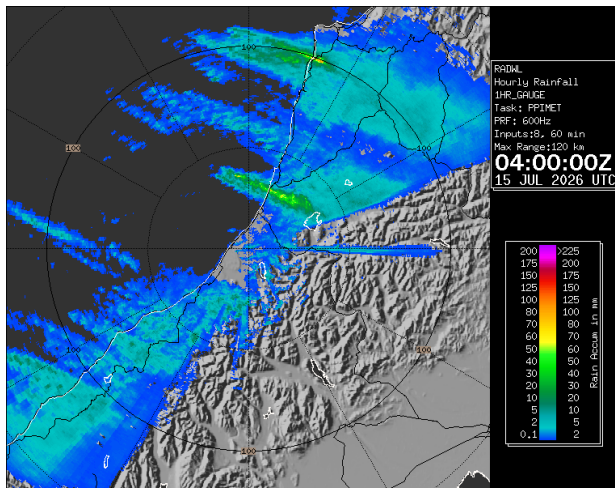
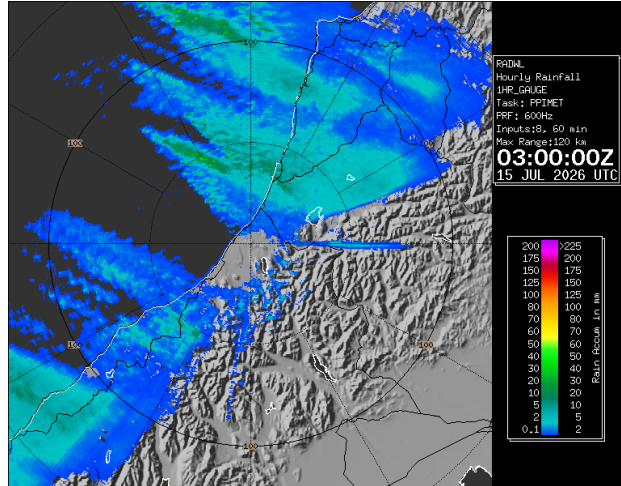
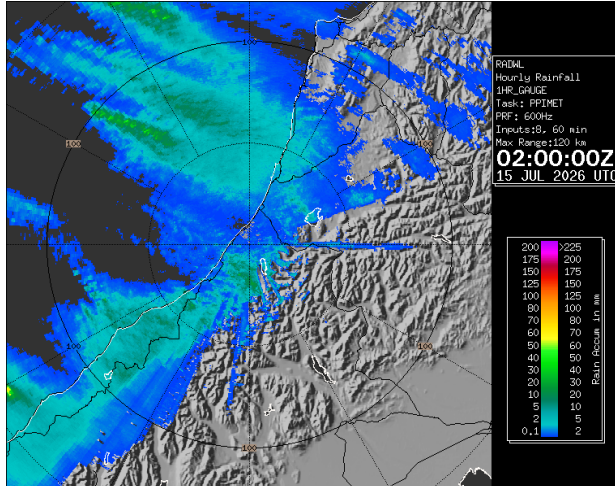
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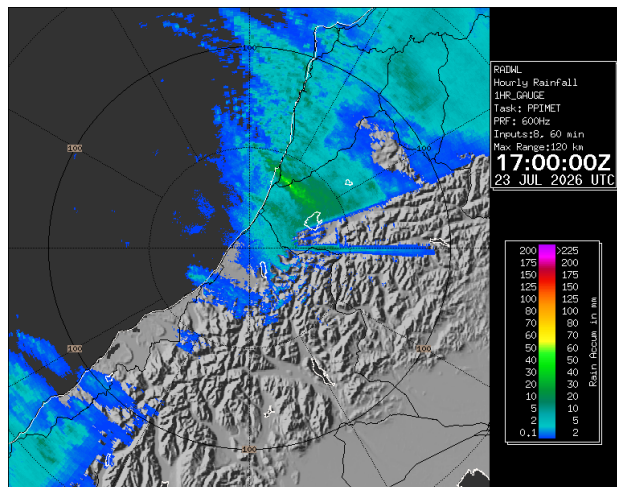
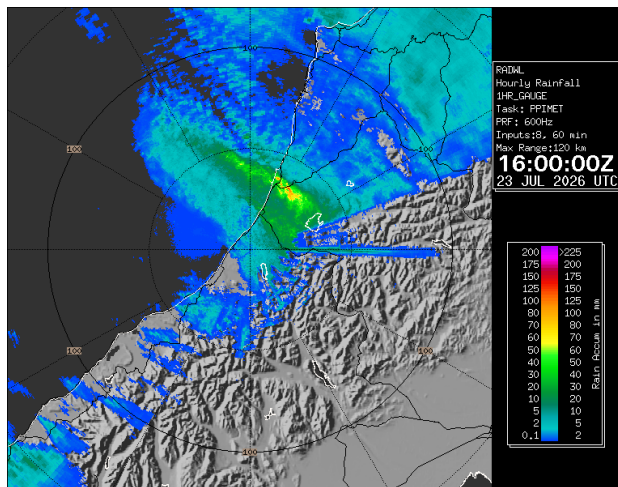
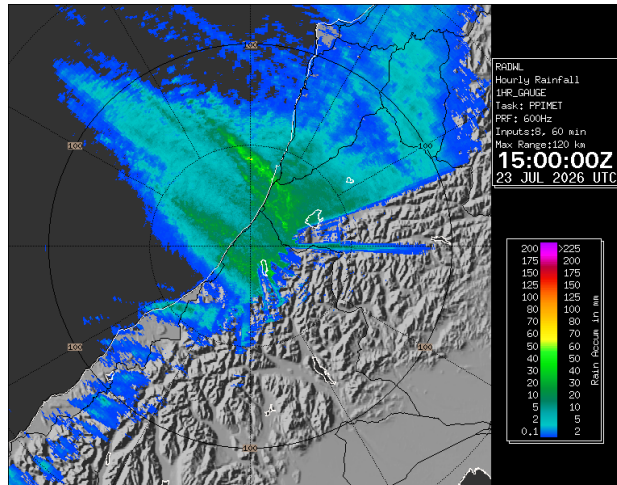
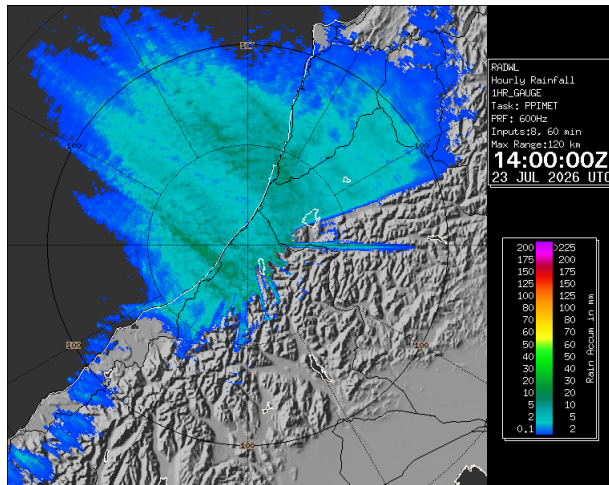
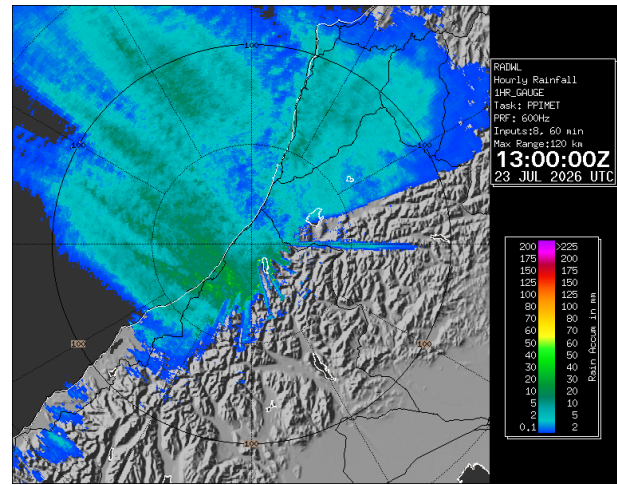
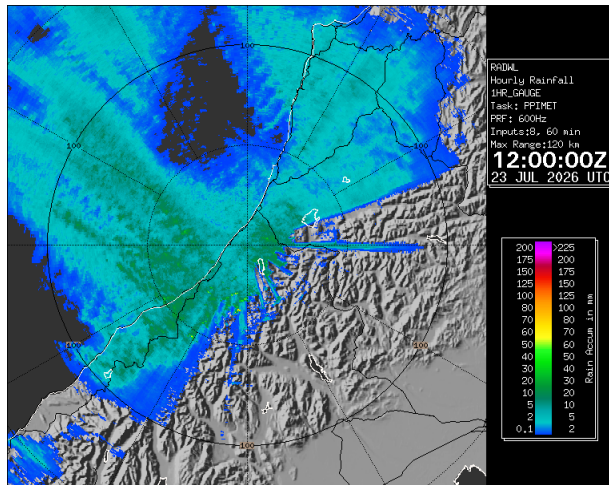
Technical Appendices

Hourly gauge corrected Rain Radar Images 15 July 2026 starting at 14:00 NZST (Radar is in UTC).



Hourly gauge corrected Rain Radar Images

24 July 2026 starting at 00:00 NZST (Radar is in UTC).



HIRDSv4 Flood Frequency Analysis

HIRDS4 - Mawheraiti Rv @ Atarau Br

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	7.6	10.3	12.3	16.9	23.2	38.4	52.6	71.7	97	115	130	142
2	0.5	8.43	11.4	13.6	18.6	25.4	41.9	57.2	77.7	105	124	140	153
5	0.2	11.4	15.3	18.2	24.5	33.2	53.8	72.7	97.8	130	154	172	188
10	0.1	13.8	18.3	21.7	29.1	39.2	62.7	84.2	112	149	175	196	213
20	0.05	16.4	21.6	25.5	34	45.4	72	96	127	168	196	219	238
30	0.033	18	23.7	27.9	37	49.2	77.6	103	136	179	209	232	252
40	0.025	19.2	25.2	29.6	39.2	52	81.7	108	143	187	217	242	262
50	0.02	20.2	26.4	31	40.9	54.3	84.9	112	148	193	224	249	270
60	0.017	21	27.4	32.2	42.4	56.1	87.5	115	152	198	230	255	276
80	0.013	22.3	29.1	34	44.7	59	91.7	121	158	206	239	265	286
100	0.01	23.4	30.4	35.5	46.6	61.4	95	125	163	212	245	272	294
250	0.004	27.9	36	41.9	54.5	71.2	109	142	184	236	272	301	324

HIRDS4 - Grey Rv @ Ngahere

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	8.61	11.8	14.2	19.6	27.1	45.3	62.4	85.5	116	138	156	172
2	0.5	9.54	13	15.7	21.6	29.7	49.4	67.8	92.5	125	149	168	184
5	0.2	12.8	17.4	20.8	28.3	38.6	63.1	85.8	116	156	184	207	226
10	0.1	15.4	20.7	24.7	33.4	45.3	73.3	98.9	133	177	209	234	255
20	0.05	18.2	24.3	28.8	38.8	52.3	83.7	112	150	198	233	260	283
30	0.033	19.9	26.5	31.4	42.1	56.5	90	120	160	211	247	276	300
40	0.025	21.2	28.1	33.3	44.5	59.6	94.5	126	167	220	257	287	311
50	0.02	22.2	29.4	34.8	46.4	62	98	130	173	227	265	295	320
60	0.017	23.1	30.5	36	48	64	101	134	177	232	271	302	327
80	0.013	24.5	32.3	38	50.5	67.2	106	140	184	241	281	312	339
100	0.01	25.6	33.6	39.6	52.5	69.7	109	144	190	248	288	320	347
250	0.004	30.3	39.5	46.3	60.9	80.2	124	163	212	275	318	352	381

HIRDS4 - Ahaura Rv @ Gorge

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	9.1	12.4	14.9	20.5	28.3	47.1	64.5	87.5	117	138	154	168
2	0.5	10.1	13.7	16.4	22.5	31	51.4	70.1	94.9	127	149	166	181
5	0.2	13.7	18.3	21.9	29.7	40.5	66.1	89.4	120	158	185	206	223
10	0.1	16.5	22	26.1	35.3	47.8	77.1	104	138	181	211	234	253
20	0.05	19.6	25.9	30.7	41.2	55.5	88.6	118	157	204	237	262	283
30	0.033	21.5	28.4	33.6	44.9	60.2	95.6	127	168	218	252	279	301
40	0.025	22.9	30.2	35.7	47.5	63.6	101	134	176	228	263	291	313
50	0.02	24.1	31.7	37.3	49.7	66.3	105	139	182	236	272	300	323
60	0.017	25.1	32.9	38.7	51.5	68.6	108	143	187	242	279	307	331
80	0.013	26.6	34.9	41	54.3	72.3	113	149	195	252	290	319	343
100	0.01	27.9	36.4	42.8	56.6	75.1	117	155	202	259	299	328	353
250	0.004	33.4	43.2	50.5	66.3	87.4	135	176	228	291	333	365	391

HIRDS4 - Grey Rv @ Waipuna

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	7.19	9.8	11.8	16.1	22.2	36.9	51	70.7	98	119	136	151
2	0.5	7.98	10.8	13	17.7	24.3	40.2	55.5	76.6	106	128	146	163
5	0.2	10.8	14.5	17.3	23.4	31.8	51.8	70.7	96.6	132	159	181	200
10	0.1	13.1	17.5	20.7	27.8	37.5	60.5	82	111	151	181	206	227
20	0.05	15.5	20.6	24.4	32.5	43.6	69.5	93.6	126	171	204	231	254
30	0.033	17.1	22.6	26.7	35.4	47.3	75	101	135	182	217	245	270
40	0.025	18.2	24.1	28.3	37.6	50	79	106	142	190	226	256	281
50	0.02	19.2	25.2	29.7	39.3	52.2	82.2	110	147	197	234	264	290
60	0.017	19.9	26.2	30.8	40.7	54	84.8	113	151	202	240	270	297
80	0.013	21.2	27.8	32.6	43	56.8	89	118	158	210	249	281	308
100	0.01	22.2	29.1	34.1	44.8	59.1	92.2	122	163	217	256	289	317
250	0.004	26.6	34.5	40.3	52.6	68.8	106	140	184	243	286	321	352

HIRDS4 - Grey Rv @ Haupiri

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	7.63	10.5	12.7	18.2	26.4	48.2	69.9	99.9	140	167	189	206
2	0.5	8.47	11.6	14.1	20.1	29	52.6	76.1	109	151	181	204	222
5	0.2	11.5	15.5	18.8	26.6	38	68	97.5	138	190	226	253	276
10	0.1	13.9	18.7	22.5	31.6	45	79.6	113	159	218	258	289	314
20	0.05	16.5	22	26.5	36.9	52.3	91.6	130	181	246	291	325	352
30	0.033	18.1	24.1	29	40.2	56.7	98.9	140	194	263	310	346	375
40	0.025	19.3	25.7	30.8	42.6	60	104	147	203	275	324	361	391
50	0.02	20.3	26.9	32.2	44.6	62.6	108	152	211	285	335	373	403
60	0.017	21.1	28	33.4	46.2	64.8	112	157	217	293	344	382	413
80	0.013	22.5	29.7	35.4	48.8	68.2	117	164	226	305	358	397	429
100	0.01	23.5	31	37	50.8	70.9	122	170	234	314	368	409	441
250	0.004	28.1	36.8	43.6	59.6	82.5	140	194	265	353	412	456	491

HIRDS4 - Grey Rv @ WCRC Office2

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	10.6	14.2	17.1	23.6	32.9	55.5	76.4	104	137	160	177	191
2	0.5	11.7	15.7	18.8	25.8	35.9	60.2	82.7	112	148	172	190	205
5	0.2	15.5	20.6	24.5	33.5	46.1	76.3	104	139	182	211	233	250
10	0.1	18.4	24.3	28.9	39.2	53.7	88.1	119	159	207	238	262	281
20	0.05	21.5	28.3	33.5	45.2	61.5	100	135	178	231	265	291	311
30	0.033	23.4	30.7	36.3	48.8	66.1	107	144	190	245	281	307	329
40	0.025	24.8	32.4	38.3	51.4	69.5	112	150	198	255	292	319	341
50	0.02	25.9	33.8	39.9	53.5	72.2	116	155	204	262	300	328	350
60	0.017	26.8	35	41.2	55.1	74.3	119	159	209	268	307	335	358
80	0.013	28.3	36.8	43.3	57.8	77.8	124	165	217	278	317	346	369
100	0.01	29.4	38.3	45	59.9	80.5	128	170	223	285	325	355	378
250	0.004	34.3	44.3	51.9	68.7	91.6	144	190	247	314	357	388	412

HIRDS4 - Greymouth Aero EWS

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	9	13.1	16.2	23	32.1	53.1	71.5	94.8	124	144	160	173
2	0.5	9.93	14.4	17.8	25.1	35.1	57.7	77.4	102	134	155	171	185
5	0.2	13.2	18.9	23.3	32.6	45.1	73.1	97.3	128	165	190	210	226
10	0.1	15.7	22.4	27.4	38.2	52.6	84.4	112	146	187	215	237	254
20	0.05	18.3	26.1	31.8	44.1	60.2	95.9	126	163	209	239	263	282
30	0.033	20	28.3	34.4	47.6	64.8	103	135	174	221	253	278	298
40	0.025	21.2	29.9	36.4	50.1	68.2	108	141	181	230	263	288	309
50	0.02	22.1	31.2	37.9	52.1	70.8	111	145	187	237	270	296	317
60	0.017	22.9	32.3	39.1	53.8	72.9	114	149	192	243	277	303	324
80	0.013	24.2	34	41.1	56.4	76.3	119	155	199	251	286	313	334
100	0.01	25.2	35.3	42.7	58.5	78.9	123	160	205	258	293	320	342
250	0.004	29.4	40.9	49.3	67.1	89.8	138	179	227	284	321	350	373

HIRDS4 - Pigeon Creek CWS

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	8.13	12.7	16.5	25.8	39.9	76.8	112	158	214	250	276	296
2	0.5	8.99	14	18.2	28.3	43.6	83.6	122	171	231	269	297	318
5	0.2	12.1	18.6	24	37.1	56.7	107	154	215	288	333	366	391
10	0.1	14.5	22.2	28.5	43.7	66.4	124	178	247	328	379	415	442
20	0.05	17	26	33.3	50.7	76.6	142	203	279	368	424	463	493
30	0.033	18.6	28.3	36.2	55	82.8	153	217	298	392	450	491	522
40	0.025	19.8	30	38.3	58.1	87.3	160	227	311	409	469	511	543
50	0.02	20.7	31.4	40	60.6	90.8	166	235	322	422	483	526	558
60	0.017	21.5	32.5	41.4	62.6	93.7	171	242	330	432	495	538	571
80	0.013	22.8	34.3	43.7	65.8	98.3	179	252	344	449	513	558	591
100	0.01	23.8	35.8	45.5	68.4	102	185	260	354	461	527	572	606
250	0.004	28	41.9	53	79.2	117	210	293	396	512	582	631	667

HIRDS4 - Kiwirail_12249

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	8.72	12.5	15.5	22.3	32.2	56.9	80.1	111	150	177	197	214
2	0.5	9.65	13.8	17	24.5	35.2	61.9	86.9	120	161	190	212	229
5	0.2	12.9	18.3	22.4	32	45.6	78.8	110	150	200	234	260	280
10	0.1	15.5	21.7	26.6	37.7	53.3	91.3	126	171	227	265	293	316
20	0.05	18.2	25.4	31	43.6	61.4	104	143	193	254	295	326	351
30	0.033	19.9	27.7	33.7	47.2	66.2	112	153	205	270	313	345	371
40	0.025	21.2	29.3	35.6	49.9	69.8	117	160	215	281	325	358	385
50	0.02	22.1	30.7	37.2	52	72.5	121	166	221	290	335	368	395
60	0.017	23	31.7	38.5	53.7	74.8	125	170	227	297	342	377	404
80	0.013	24.3	33.5	40.6	56.5	78.5	131	177	236	308	355	390	418
100	0.01	25.4	34.9	42.2	58.6	81.3	135	183	243	316	364	399	428
250	0.004	29.9	40.8	49.2	67.7	93.2	153	205	271	349	400	438	468

HIRDS4 - Kiwirail_11846

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	9.45	13.9	17.4	25.1	35.7	60.8	83.6	113	152	179	200	218
2	0.5	10.4	15.3	19.1	27.4	38.9	65.9	90.4	122	163	192	215	234
5	0.2	13.8	20.1	24.9	35.5	49.9	83.4	113	152	201	235	262	285
10	0.1	16.4	23.7	29.3	41.5	58	96.1	130	173	227	265	295	320
20	0.05	19.1	27.5	33.9	47.7	66.4	109	146	194	254	295	327	354
30	0.033	20.8	29.9	36.7	51.5	71.4	117	156	206	269	312	345	373
40	0.025	22.1	31.6	38.7	54.3	75	122	163	215	279	324	358	387
50	0.02	23	32.9	40.3	56.4	77.9	126	168	222	288	333	368	398
60	0.017	23.8	34	41.6	58.2	80.2	130	173	227	294	340	376	406
80	0.013	25.1	35.8	43.8	61	83.9	135	180	236	305	352	389	419
100	0.01	26.2	37.2	45.4	63.2	86.8	140	185	242	312	361	398	429
250	0.004	30.6	43.1	52.4	72.4	98.7	157	207	268	344	395	435	467

HIRDS - FENZ_12820

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	7.49	10.1	12.1	16.6	22.9	38	52.2	71.3	96.5	115	129	141
2	0.5	8.31	11.2	13.4	18.3	25.1	41.4	56.8	77.3	104	123	139	152
5	0.2	11.3	15	17.9	24.1	32.8	53.3	72.2	97.3	130	153	171	187
10	0.1	13.6	18	21.3	28.6	38.6	62.2	83.7	112	148	174	194	211
20	0.05	16.2	21.3	25.1	33.4	44.8	71.4	95.4	127	167	195	217	236
30	0.033	17.8	23.3	27.4	36.4	48.6	76.9	102	136	178	208	231	250
40	0.025	19	24.8	29.1	38.6	51.4	81	108	142	186	216	240	260
50	0.02	19.9	26	30.5	40.3	53.5	84.1	112	147	192	223	248	268
60	0.017	20.7	27	31.6	41.8	55.4	86.8	115	151	197	229	254	275
80	0.013	22	28.6	33.5	44.1	58.3	91	120	158	205	238	263	285
100	0.01	23.1	29.9	35	45.9	60.6	94.2	124	163	211	244	271	292
250	0.004	27.6	35.5	41.3	53.8	70.3	108	141	183	236	272	300	323

HIRDS - FENZ_12586

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	8.65	11.7	14.1	19.4	26.8	45.1	62.5	86.2	118	141	159	175
2	0.5	9.58	12.9	15.5	21.3	29.4	49.1	67.8	93.2	127	151	171	188
5	0.2	12.9	17.2	20.5	27.9	38.1	62.8	85.8	117	158	187	210	230
10	0.1	15.5	20.6	24.4	33	44.7	72.9	99	134	179	212	238	260
20	0.05	18.3	24.2	28.6	38.3	51.6	83.3	112	151	201	237	265	288
30	0.033	20	26.4	31.1	41.5	55.8	89.5	120	161	214	251	280	305
40	0.025	21.3	28	33	43.9	58.9	94	126	168	223	261	292	317
50	0.02	22.4	29.3	34.4	45.8	61.3	97.5	131	174	230	269	300	326
60	0.017	23.2	30.3	35.7	47.4	63.2	100	134	178	235	275	307	333
80	0.013	24.6	32.1	37.7	49.9	66.4	105	140	186	244	285	318	345
100	0.01	25.7	33.5	39.2	51.8	68.9	109	145	191	251	293	326	354
250	0.004	30.5	39.3	45.9	60.1	79.3	123	163	214	278	323	359	388

GDC/ Public_Marsden Rd

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	9.07	13.2	16.3	23.2	32.4	53.7	72.4	96.2	126	146	162	176
2	0.5	10	14.5	17.9	25.4	35.4	58.3	78.4	104	136	157	174	189
5	0.2	13.3	19.1	23.4	32.9	45.5	74	98.6	129	168	194	214	230
10	0.1	15.8	22.6	27.6	38.5	53	85.4	113	148	190	219	241	259
20	0.05	18.4	26.2	32	44.4	60.8	97	128	166	212	244	268	288
30	0.033	20.1	28.4	34.6	48	65.4	104	136	177	225	258	283	304
40	0.025	21.3	30.1	36.6	50.5	68.8	109	143	184	234	268	294	315
50	0.02	22.2	31.4	38.1	52.5	71.4	113	147	190	241	276	302	324
60	0.017	23	32.4	39.4	54.2	73.5	116	151	195	247	282	309	331
80	0.013	24.3	34.1	41.4	56.8	76.9	121	157	202	256	292	319	341
100	0.01	25.3	35.5	43	58.9	79.6	125	162	208	263	299	327	350
250	0.004	29.5	41.1	49.6	67.5	90.6	140	181	230	289	328	357	382

Data from other sources, Kiwirail Graphs, screenshots etc.

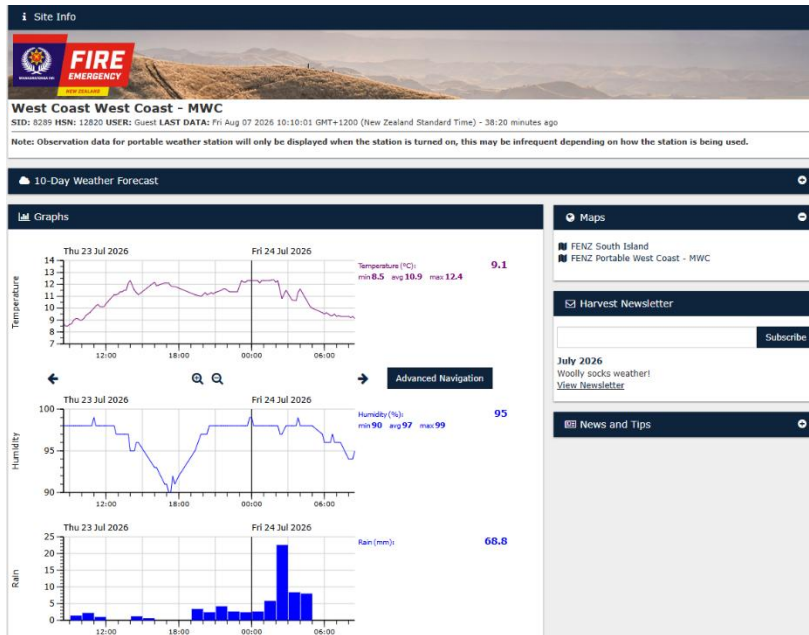


Figure 18: Screenshot from Fire Emergency NZ showing data from their West Coast portable rain gauge (HSN: 12820) for the 24 July 2026 event.

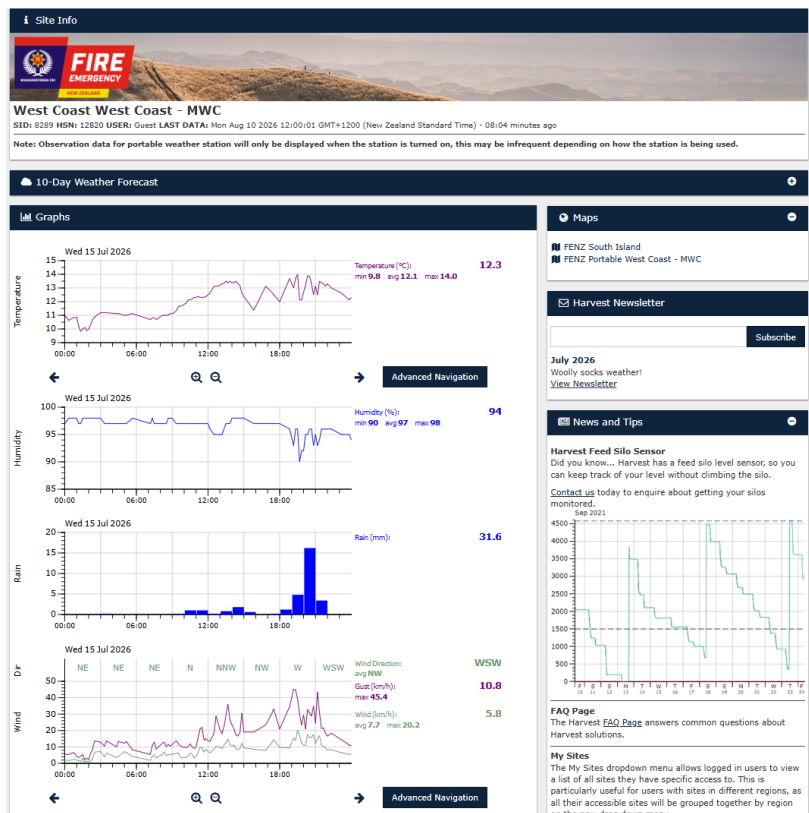


Figure 19: Screenshot from Fire Emergency NZ showing data from their West Coast portable rain gauge (HSN: 12820) for the 15 July 2026 event.

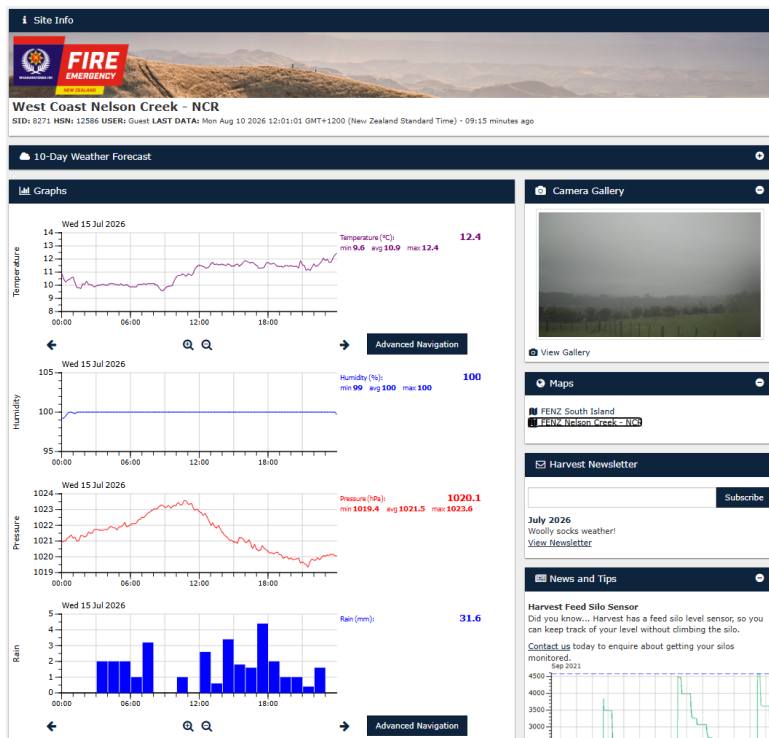


Figure 20: Screenshot from Fire Emergency NZ showing data from their West Coast rain gauge (HSN: 12586) for the 15 July 2026 event.

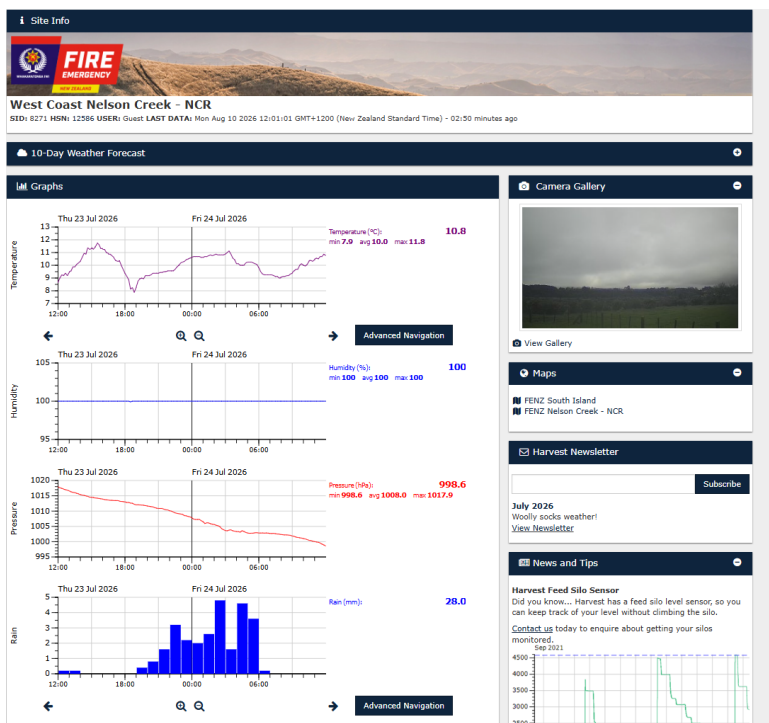


Figure 21: Screenshot from Fire Emergency NZ showing data from their West Coast portable rain gauge (HSN 12586) for the 24 July 2026 event.

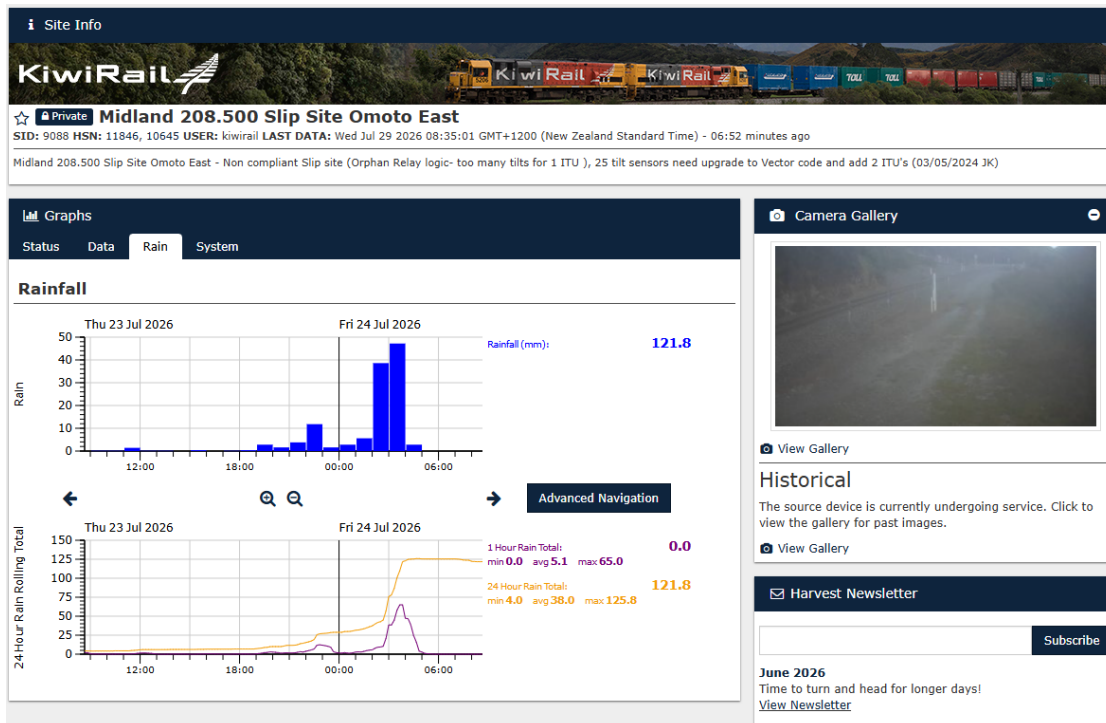


Figure 22: Screenshot from KiwiRail showing data from their rain gauge located at Slip Site Omoto East for the 24 July 2026 event.

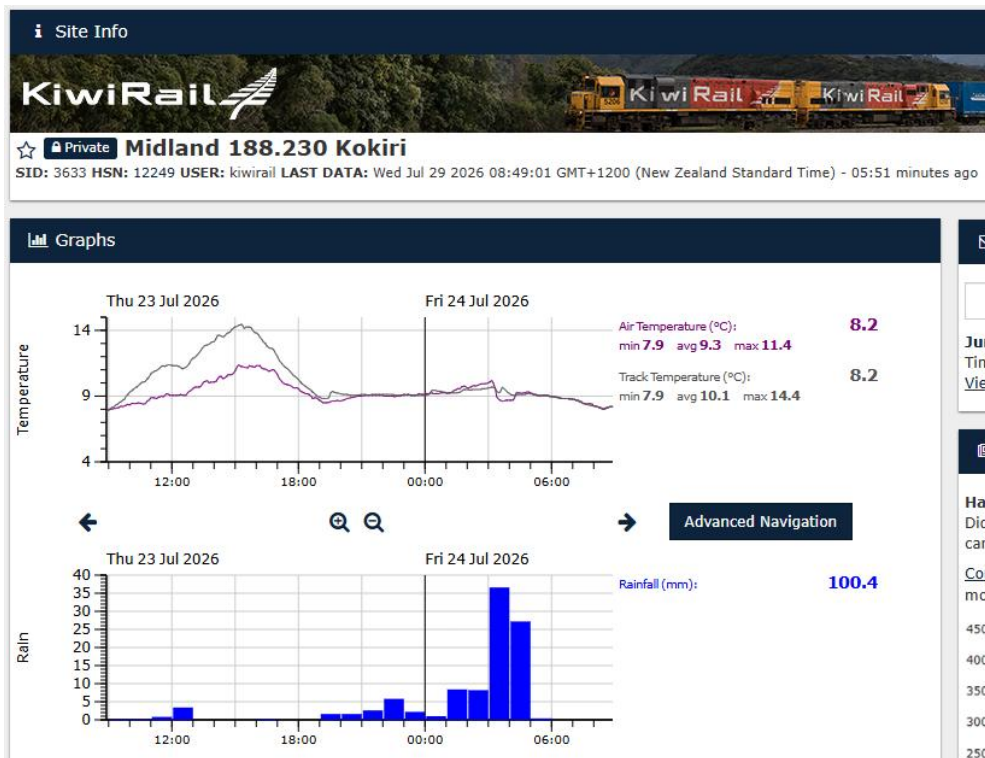


Figure 23: Screenshot from KiwiRail showing data from their rain gauge located at Kokiri for the 24 July 2026 event.

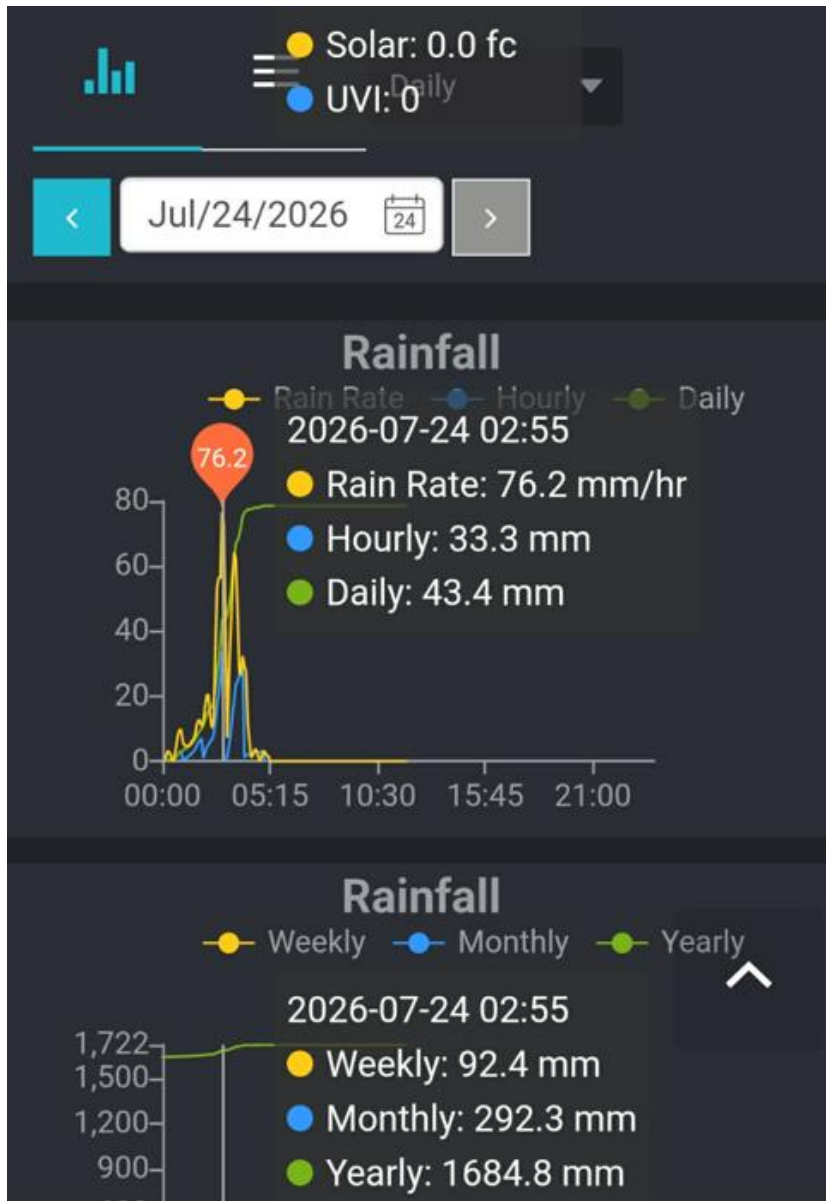


Figure 24Figure 25: Screenshot from a private weather station located in the Marsden Road/Ida Street area of Greymouth for the 24 July 2026 event.

Rainfall Frequency Analysis

Source is K:\HILLTOP\Hydro\Events\2026_July24_LocalRFEEvent_IM_20260805.hts					
Rainfall (mm) at Greymouth Aero EWS					
From 17-Jul-2002 17:00:00 to 1-Jul-2026 00:00:00					
Location = 20.631 Scale = 4.404 Shape = -0.171 100yr/2.33yr = 2.206					
GEV exponent -0.17067 has magnitude greater than 0.10326 and so GEV fits better than Gumbel					
1 hour duration. Record: 24 years					
Data selected from months 7 to 6 inclusive					
			-- G.E.V. Distribution --		
12 mth Partition starts	-483932018:-02 mean	Measured maximum	1.96 std. d	Prob. per y	Return Period
			78.7	0.001	1000
			69.3	0.002	500
			58.5	0.005	200
			51.4	0.01	100
			45	0.02	50
1-Jul-2017	11/01/2018 08:00	41.4	41.4	0.031	32.3
1-Jul-2008	27/04/2009 19:00	38.2	38.2	0.047	21.5
			37.7	0.05	20
1-Jul-2022	01/06/2023 20:00	34.1	34.1	0.082	12.2
			32.7	0.1	10
1-Jul-2003	02/03/2004 03:00	31.8	31.8	0.114	8.7
1-Jul-2014	06/03/2015 06:00	30.9	30.9	0.131	7.6
1-Jul-2024	16/09/2024 08:00	28.4	28.4	0.193	5.2
			28.2	0.2	5
1-Jul-2012	30/12/2012 12:00	24.4	24.4	0.362	2.8
1-Jul-2009	28/04/2010 17:00	24	24	0.386	2.6
1-Jul-2013	07/05/2014 01:00	23.7	23.7	0.404	2.5
1-Jul-2025	27/01/2026 00:00	23.4	23.4	0.423	2.4
			23.3	0.43	2.33
1-Jul-2023	31/12/2023 03:00	23.2	23.2	0.436	2.3
1-Jul-2019	10/08/2019 20:00	23	23	0.45	2.2
1-Jul-2002	03/03/2003 16:00	22.8	22.8	0.464	2.2
1-Jul-2021	09/02/2022 13:00	20.9	20.9	0.61	1.6
1-Jul-2015	21/11/2015 11:00	20.8	20.8	0.618	1.6
1-Jul-2016	13/07/2016 19:00	20.3	20.3	0.66	1.5
1-Jul-2018	27/03/2019 03:00	20.2	20.2	0.668	1.5
1-Jul-2005	11/06/2006 12:00	20.2	20.2	0.668	1.5
1-Jul-2010	26/05/2011 04:00	19.6	19.6	0.719	1.4
1-Jul-2007	29/03/2008 01:00	19.1	19.1	0.761	1.3
1-Jul-2011	06/06/2012 05:00	18.6	18.6	0.801	1.2
1-Jul-2006	17/04/2007 04:00	16.2	16.2	0.951	1.1
1-Jul-2020	15/03/2021 20:00	16.2	16.2	0.951	1.1
1-Jul-2004	01/09/2004 07:00	16	16	0.959	1
		Mean =	24.1		

Source is K:\HILLTOP\Hydro\Events\2026_July24_LocalRFEEvent_IM_20260805.hts						
Rainfall (mm) at Greymouth Aero EWS						
From 17-Jul-2002 17:00:00 to 1-Jul-2026 00:00:00						
Location = 30.290 Scale = 6.752 Shape = -0.174 100yr/2.33yr = 2.264						
GEV exponent -0.17385 has magnitude greater than 0.10326 and so GEV fits better than Gumbel						
2 hour duration. Record: 24 years						
Data selected from months 7 to 6 inclusive						
			-- G.E.V. Distribution --			
12 mth Partitio	-483932018:-02 mear	Measured maximum	1.96 std. d	Prob. per	Return Period	
			120.5	0.001	1000	
			105.8	0.002	500	
			89	0.005	200	
			77.9	0.01	100	
1-Jul-2017	11/01/2018 07:00	73.9	73.9	0.013	76.5	
			68	0.02	50	
			56.5	0.05	20	
1-Jul-2014	06/03/2015 05:00	53.9	53.9	0.063	15.9	
1-Jul-2008	27/04/2009 18:00	51.6	51.6	0.078	12.9	
			48.9	0.1	10	
			41.9	0.2	5	
1-Jul-2022	01/06/2023 19:00	40.1	40.1	0.239	4.2	
1-Jul-2015	24/03/2016 03:00	38.6	38.6	0.279	3.6	
1-Jul-2010	26/05/2011 03:00	38.4	38.4	0.285	3.5	
1-Jul-2005	11/06/2006 11:00	38	38	0.297	3.4	
1-Jul-2003	02/03/2004 03:00	37.4	37.4	0.316	3.2	
1-Jul-2011	06/06/2012 05:00	37	37	0.33	3	
1-Jul-2025	26/01/2026 23:00	36.8	36.8	0.336	3	
			34.4	0.43	2.33	
1-Jul-2023	31/12/2023 03:00	33.8	33.8	0.456	2.2	
1-Jul-2019	10/08/2019 20:00	33.6	33.6	0.465	2.2	
1-Jul-2021	09/02/2022 12:00	33.3	33.3	0.478	2.1	
1-Jul-2012	02/04/2013 22:00	32.7	32.7	0.507	2	
1-Jul-2024	16/09/2024 07:00	32.5	32.5	0.517	1.9	
1-Jul-2013	07/05/2014 01:00	31.1	31.1	0.589	1.7	
1-Jul-2009	23/07/2009 07:00	30.7	30.7	0.61	1.6	
1-Jul-2018	27/03/2019 02:00	29.8	29.8	0.659	1.5	
1-Jul-2016	18/01/2017 23:00	27.5	27.5	0.785	1.3	
1-Jul-2004	29/05/2005 00:00	26.8	26.8	0.821	1.2	
1-Jul-2020	12/07/2020 16:00	26.3	26.3	0.845	1.2	
1-Jul-2002	25/12/2002 21:00	25	25	0.902	1.1	
1-Jul-2007	29/03/2008 00:00	23.4	23.4	0.954	1	
1-Jul-2006	17/03/2007 07:00	21.6	21.6	0.986	1	
		Mean =	35.6			

Source is K:\HILLTOP\Hydro\Events\2026_July24_LocalRFEEvent_IM_20260805.hts					
Rainfall (mm) at Grey Rv @ WCRC Office2					
From 24-Dec-2004 08:30:00 to 1-Jul-2026 00:00:00					
Location = 23.881 Scale = 5.314 Shape = 0.249 100yr/2.33yr = 1.437					
GEV exponent 0.24917 has magnitude greater than 0.10785 and so GEV fits better than Gumbel					
1 hour duration. Record: 21 years					
Data selected from months 7 to 6 inclusive					
			-- G.E.V. Distribution --		
12 mth Par	-483932018:-02 mea	Measured maximum		1.96 std. d	Prob. per y
			41.4	0.001	1000
			40.7	0.002	500
			39.5	0.005	200
			38.4	0.01	100
			37.1	0.02	50
1-Jul-2017	11/01/2018 07:32	37	37	0.021	47.1
			35	0.05	20
1-Jul-2012	02/01/2013 10:15	34	34	0.073	13.7
1-Jul-2022	18/04/2023 17:19	33.5	33.5	0.085	11.7
			33	0.1	10
			30.5	0.2	5
1-Jul-2010	26/05/2011 03:20	30.5	30.5	0.202	5
1-Jul-2024	16/12/2024 03:52	29.7	29.7	0.243	4.1
1-Jul-2011	06/06/2012 00:55	28.5	28.5	0.313	3.2
1-Jul-2005	26/04/2006 03:40	28.5	28.5	0.313	3.2
1-Jul-2004	29/05/2005 00:18	28	28	0.345	2.9
1-Jul-2019	21/02/2020 12:05	27.5	27.5	0.378	2.6
			26.7	0.43	2.33
1-Jul-2008	11/07/2008 23:30	26	26	0.482	2.1
1-Jul-2009	23/07/2009 07:20	26	26	0.482	2.1
1-Jul-2014	27/04/2015 02:24	25.6	25.6	0.509	2
1-Jul-2018	27/03/2019 02:49	25.4	25.4	0.526	1.9
1-Jul-2015	11/05/2016 10:57	25	25	0.553	1.8
1-Jul-2007	29/03/2008 01:10	24	24	0.624	1.6
1-Jul-2016	18/01/2017 20:25	23.2	23.2	0.678	1.5
1-Jul-2021	09/02/2022 16:19	22.3	22.3	0.735	1.4
1-Jul-2013	07/05/2014 01:30	21.5	21.5	0.783	1.3
1-Jul-2020	22/12/2020 00:22	20.7	20.7	0.827	1.2
1-Jul-2025	22/05/2026 09:20	18.2	18.2	0.925	1.1
1-Jul-2023	02/03/2024 17:54	18.1	18.1	0.927	1.1
1-Jul-2006	01/06/2007 14:50	16	16	0.971	1
		Mean = 25.9			

Source is K:\HILLTOP\Hydro\Events\2026_July24_LocalRFEEvent_IM_20260805.hts					
Rainfall (mm) at Grey Rv @ WCRC Office2					
From 24-Dec-2004 08:30:00 to 1-Jul-2026 00:00:00					
Location = 33.155 Scale = 6.928 Shape = -0.139 100yr/2.33yr = 2.085					
GEV exponent -0.13929 has magnitude greater than 0.10785 and so GEV fits better than Gumbel					
2 hour duration. Record: 21 years					
Data selected from months 7 to 6 inclusive					
-- G.E.V. Distribution --					
12 mth Partition starts	-360033804:-02 mean sta	Measured maximum	1.96 std. d	Prob. per y	Return Period
		113.6		0.001	1000
		101.6		0.002	500
		87.4		0.005	200
		77.8		0.01	100
		69.1		0.02	50
1-Jul-2012	02/01/2013 09:55	63	63	0.034	29.7
1-Jul-2017	11/01/2018 06:41	59.8	59.8	0.045	22.3
		58.6		0.05	20
1-Jul-2010	26/05/2011 02:40	55	55	0.071	14.2
		51.5		0.1	10
1-Jul-2014	06/03/2015 04:59	46.4	46.4	0.167	6
		44.7		0.2	5
1-Jul-2022	18/04/2023 16:32	43.7	43.7	0.223	4.5
1-Jul-2015	24/03/2016 03:03	42.6	42.6	0.25	4
1-Jul-2011	06/06/2012 00:20	41	41	0.295	3.4
1-Jul-2005	26/04/2006 02:45	38.5	38.5	0.382	2.6
1-Jul-2024	16/12/2024 02:57	37.4	37.4	0.426	2.3
		37.3		0.43	2.33
1-Jul-2019	21/02/2020 11:05	36.5	36.5	0.466	2.1
1-Jul-2009	23/07/2009 06:10	35.5	35.5	0.512	2
1-Jul-2021	28/11/2021 01:01	35.3	35.3	0.521	1.9
1-Jul-2018	27/03/2019 02:07	35.1	35.1	0.532	1.9
1-Jul-2004	28/05/2005 23:23	35	35	0.537	1.9
1-Jul-2013	07/05/2014 01:00	33	33	0.64	1.6
1-Jul-2007	29/03/2008 00:05	32.5	32.5	0.667	1.5
1-Jul-2008	11/07/2008 22:45	31.5	31.5	0.721	1.4
1-Jul-2023	09/06/2024 13:15	31.1	31.1	0.742	1.3
1-Jul-2020	28/03/2021 11:15	29.9	29.9	0.803	1.2
1-Jul-2006	29/06/2007 20:30	27	27	0.924	1.1
1-Jul-2016	18/01/2017 19:25	27	27	0.924	1.1
1-Jul-2025	10/10/2025 09:00	24.7	24.7	0.977	1
		Mean = 38.3			