

Briefing Note: Scottish Environment Protection Agency

Flooding in Dingwall, 10th July and 5th August 2019.

Responsibilities for Flooding: SEPA's role.

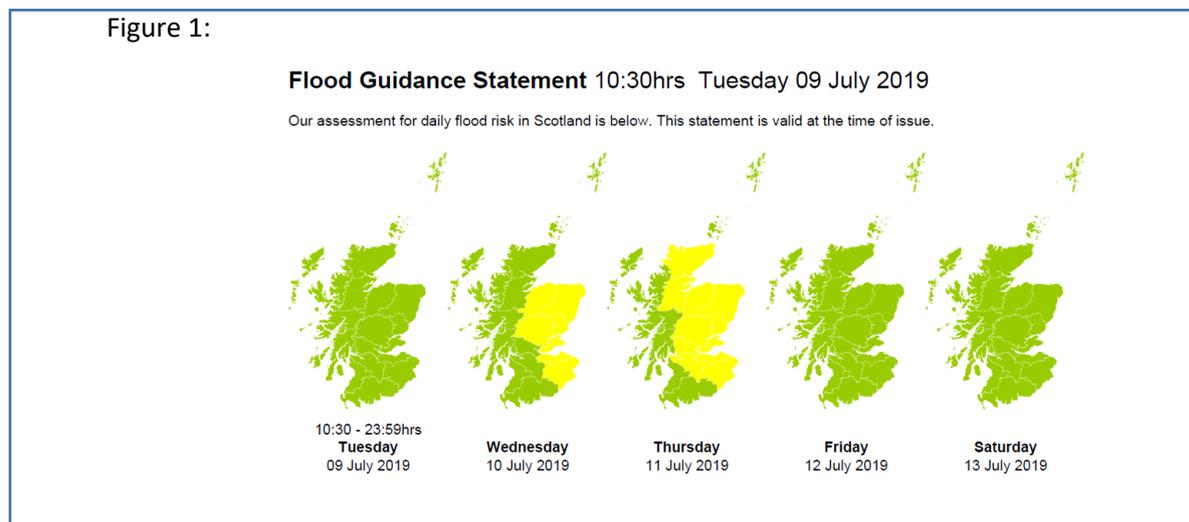
Individual householders, land owners and businesses are the first line of defence against flooding; however other public bodies have responsibilities too and together with SEPA are working towards reducing the overall impacts of flooding in Scotland.

SEPA is Scotland's national flood forecasting, flood warning authority and strategic flood risk management authority.

- We work in partnership with the Met Office to forecast for flooding and operate Floodline in Scotland to warn the public and emergency responders when flooding is likely;
- We produce Scotland's Flood Risk Management Strategies;
- We work closely with other organisations responsible for managing flood risk to ensure that a nationally consistent approach to flood risk management is adopted;
- We provide flood risk advice to land use planning in Scotland when requested;
- We raise awareness of flooding at a national level through education initiatives, community engagement and campaigns.

Further information can be found on our Website <https://www.sepa.org.uk/> there is a direct link to the Flooding section on the title bar. <https://www.sepa.org.uk/environment/water/flooding/>

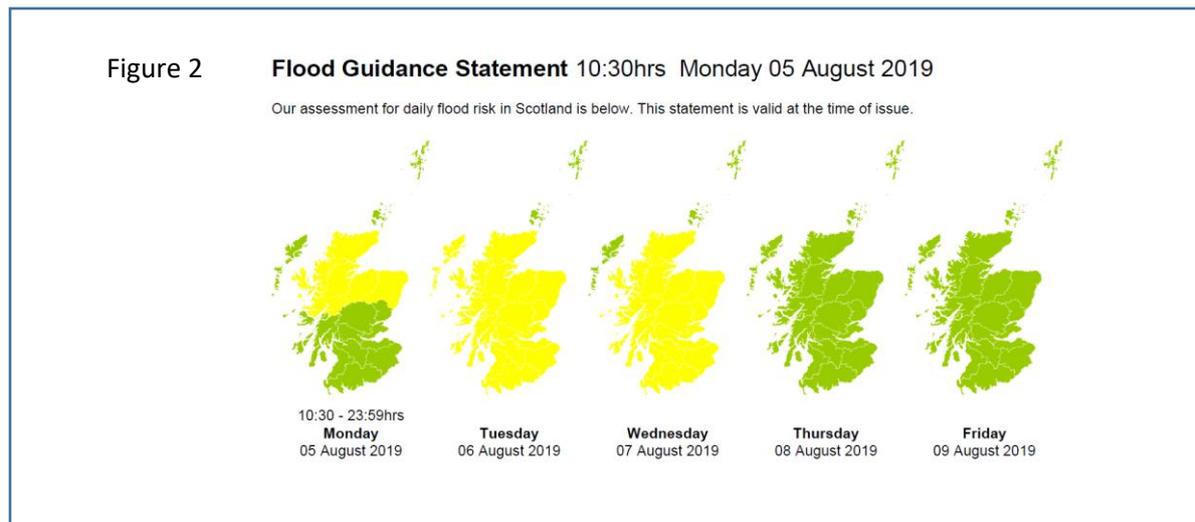
SEPA's Flood Forecasting 9th July 2019 and 5th August 2019



SEPA provide a daily Flood Guidance Statement (FGS) to CAT 1 and CAT 2 partners, sent by email at 10:30; this is not available to the public. This is prepared in consultation with the Met Office and when a risk is identified, a teleconference is held in advance of its dissemination which includes SEPA and Met Office forecasters; flood advisors and local flood warning duty officers.

On Tuesday 9th July the FGS for Scotland highlighted potential thunderstorms and associated surface water flooding risk for Wednesday the 10th and Thursday 11th July. As the Met office had low confidence for thunderstorms for Wednesday the focus for public messages via SEPA flood Alerts and Met Office Thunderstorm warnings was for Thursday. At no point was a specific concern identified for the Dingwall and Inverness area.

On Monday the 5th August SEPA and the Met office provided warnings for slow moving heavy and thundery showers across the North of Scotland. SEPA Flood Alerts and met Office Warnings were issued on Monday morning for the wider area which included Dingwall.



In Scotland this summer has been characterised by weather producing thunderstorms; for SEPA for a few weeks issuing flood messages was almost a daily occurrence. Unfortunately neither SEPA nor the Met Office are able to accurately predict in advance where surface water flooding from heavy thundery rain cells will occur; all we can provide is an indicative area on a map within which the individual storm cells may appear.

When members of the public receive flood alerts and warnings whether from Floodline, <https://floodline.sepa.org.uk/floodupdates/> or from the Met Office, SEPA's advice is to follow a personal plan of action. This should begin with a heightened awareness of available weather forecasts, including those showing rainfall radar and lightning strikes and follow a plan to help protect both themselves and their property, see <http://www.floodlinescotland.org.uk/>

Unfortunately SEPA is aware that that this summer, where the flood messages have been so frequent, it has been difficult for partners and the public to sustain vigilance when storms have continuously passed them by without impact. Having a personal plan allows individuals and organisations to make an informed assessment of risk.

Rainfall in Dingwall for recent and historic events.

The following Graphs give the rainfall at SEPA’s automated rain gauge in Dingwall together with the river levels of the River Peffery at Strathpeffer and at Peters Bridge in Dingwall.

Figure 3 – 10th July 2019. Rainfall resulting in flooding in Dingwall

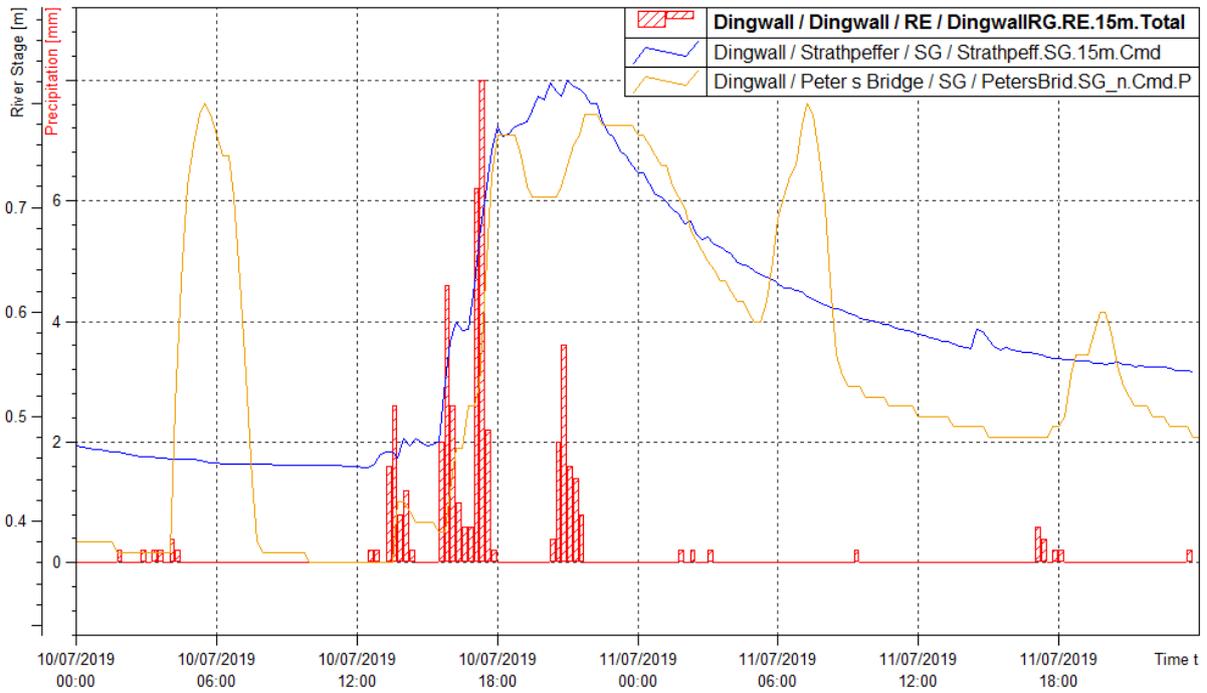


Figure 4, 5th August 2019. Rainfall resulting in localised flooding in Dingwall

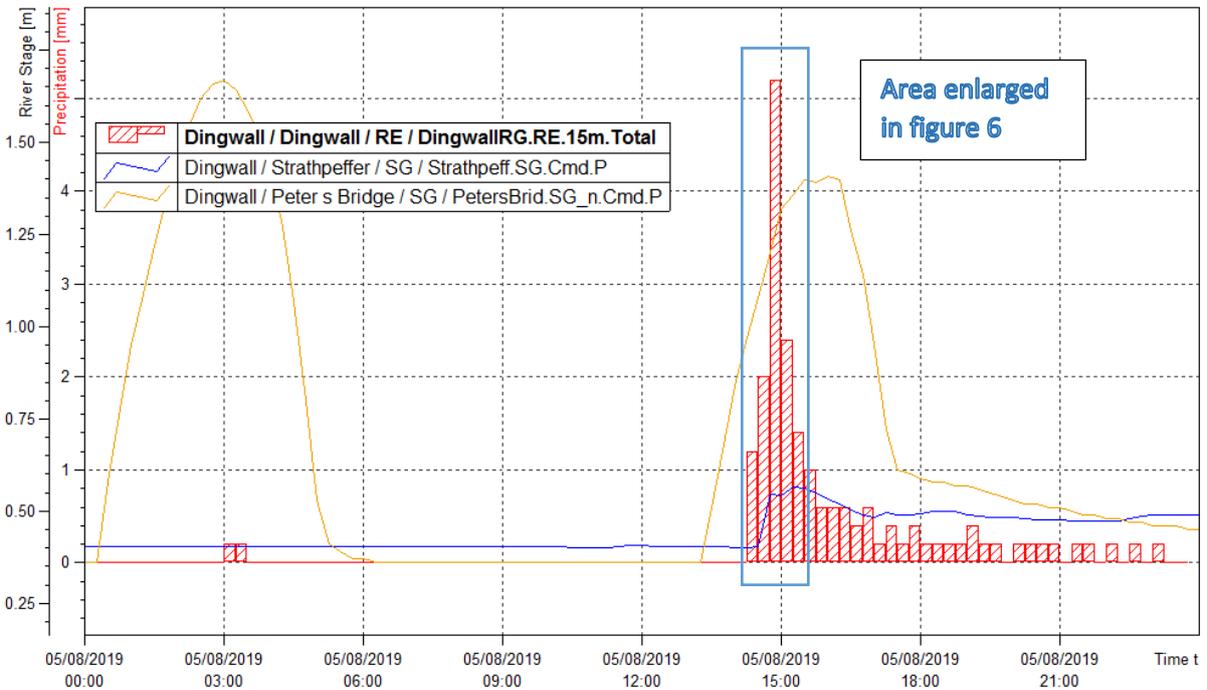


Figure 5 - 25th to 26th October 2006. Rainfall resulting in widespread flooding in Dingwall

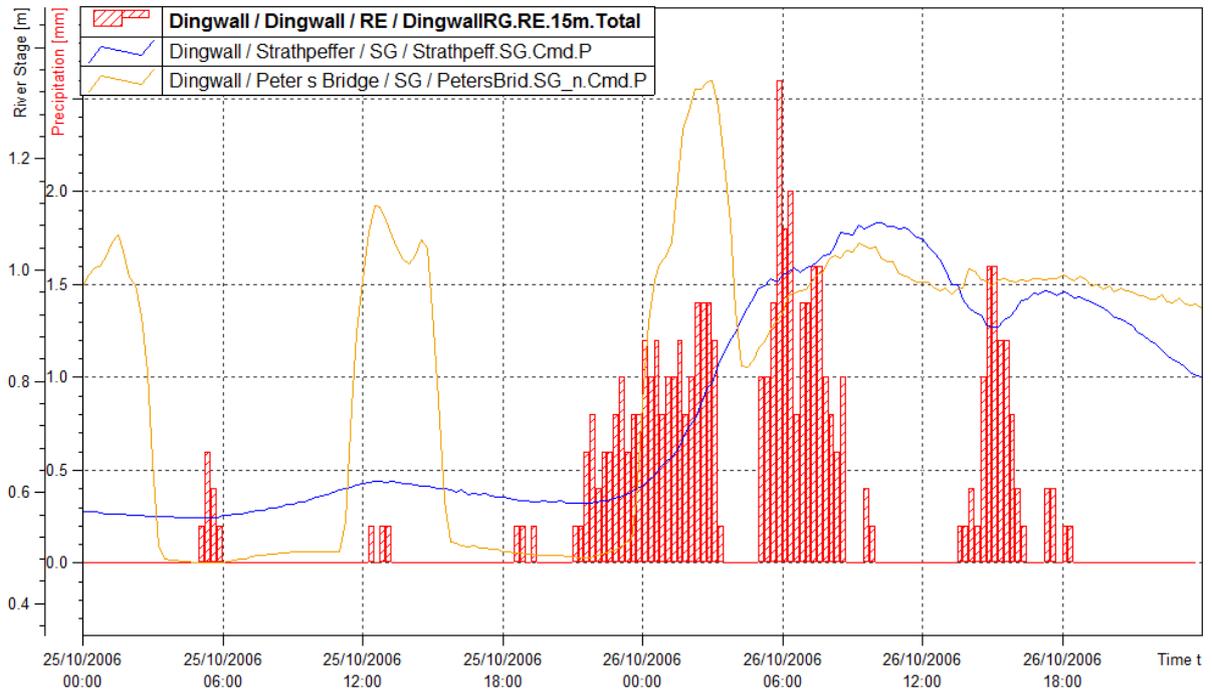


Figure 6 – Rainfall for the 5th of August showing Instantaneous rainfall rate (dark blue line) and recorded 15 minute totals (Light blue columns)

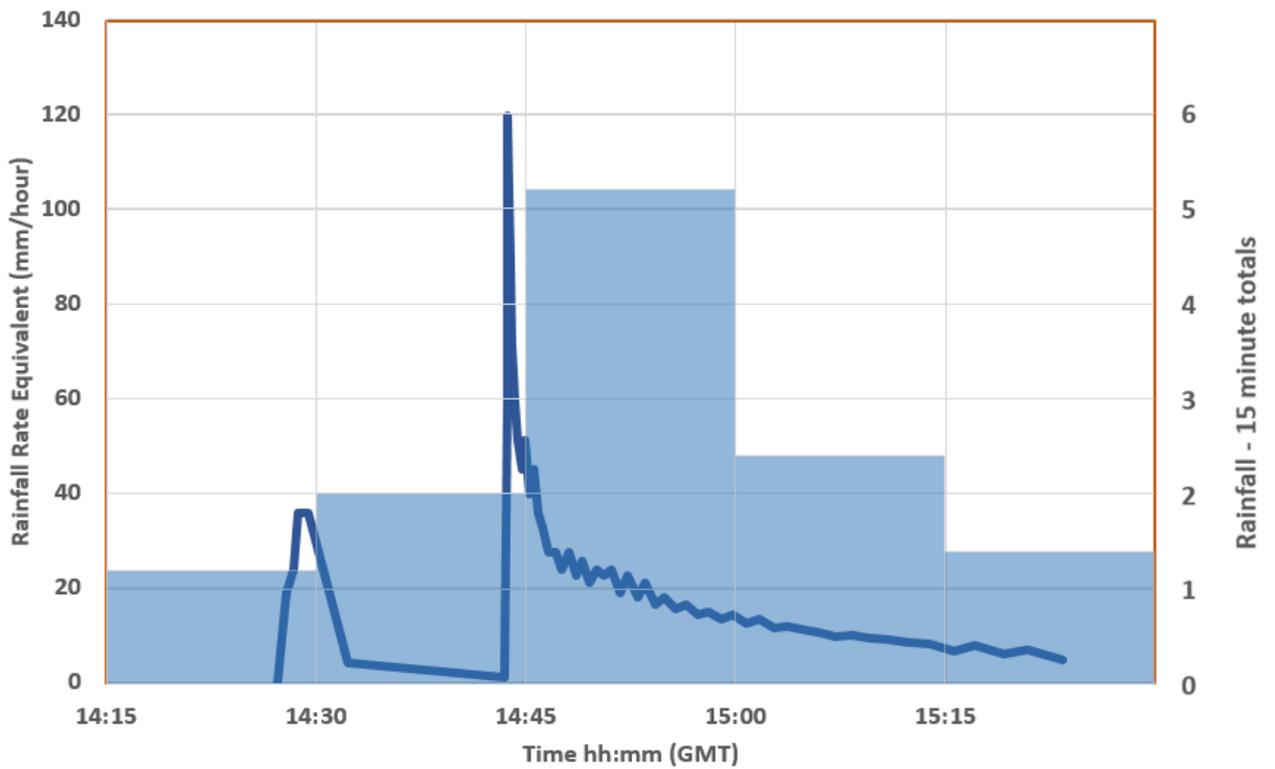


Table 1, Dingwall Rainfall for the top 8 24 hour rainfall events since 1985 plus events for July and August 2019.

Date	12 Aug 1988	07 Sep 1995	18 May 1997	21 Oct 2002	14 Nov 2002	25 Oct 2006	10 Aug 2014	10 Jul 2019	05 Aug 2019
Storm Duration (Hours)	7.25	18.75	54.50	51.75	11.00	21.25	22.25	9.25	5.50
Storm Total Rainfall	68.6	50	57.2	72.6	49.4	53.6	51.8	46.2	23.6
15 minute Max	13.4	2.8	1.6	1.8	16	2.6	1.8	8	5.2
Hourly Max	31.4	8.2	4.8	4.2	30.4	7.8	6.2	16.6	11
6 Hour Max	67.6	23.8	23.8	20.8	36.4	24.2	23.2	34.8	18.8
12 Hour Max	68.4	40.8	34.8	36.2	41.2	42.2	36.4	44.6	21.2
24 Hour Max	68.6	50	45.4	54.4	49.4	53.6	51.8	46.2	21.8

Figure 7: Dingwall 24 hour maximum Rainfall for top 8 events since 1985 plus events for July and August 2019.

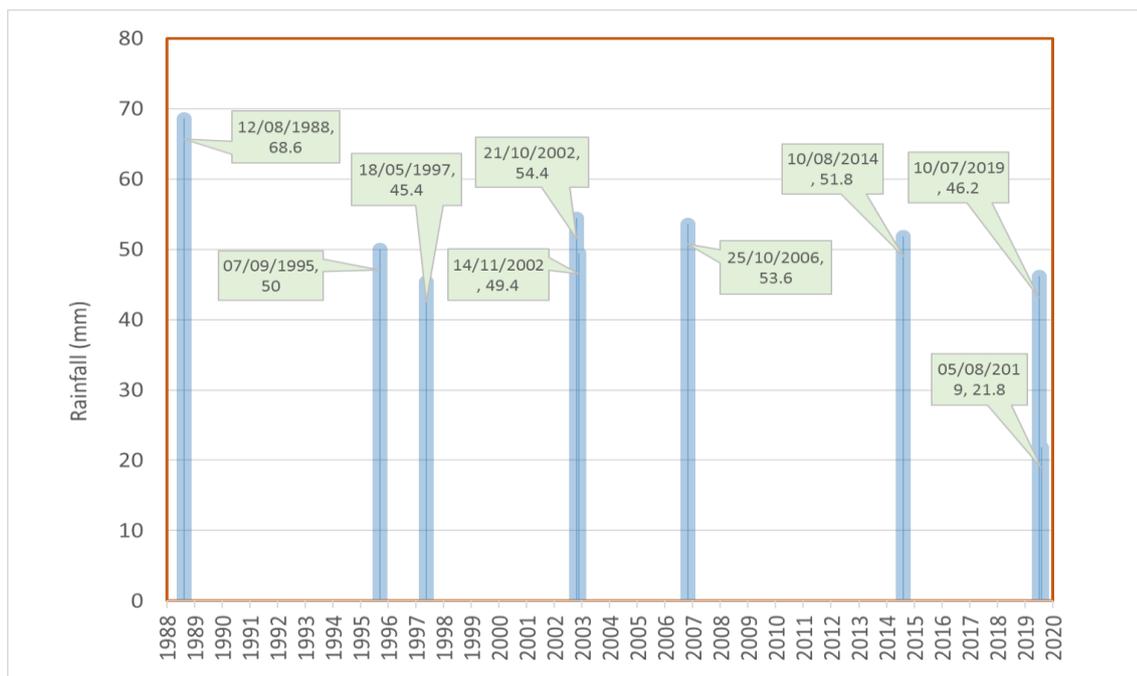
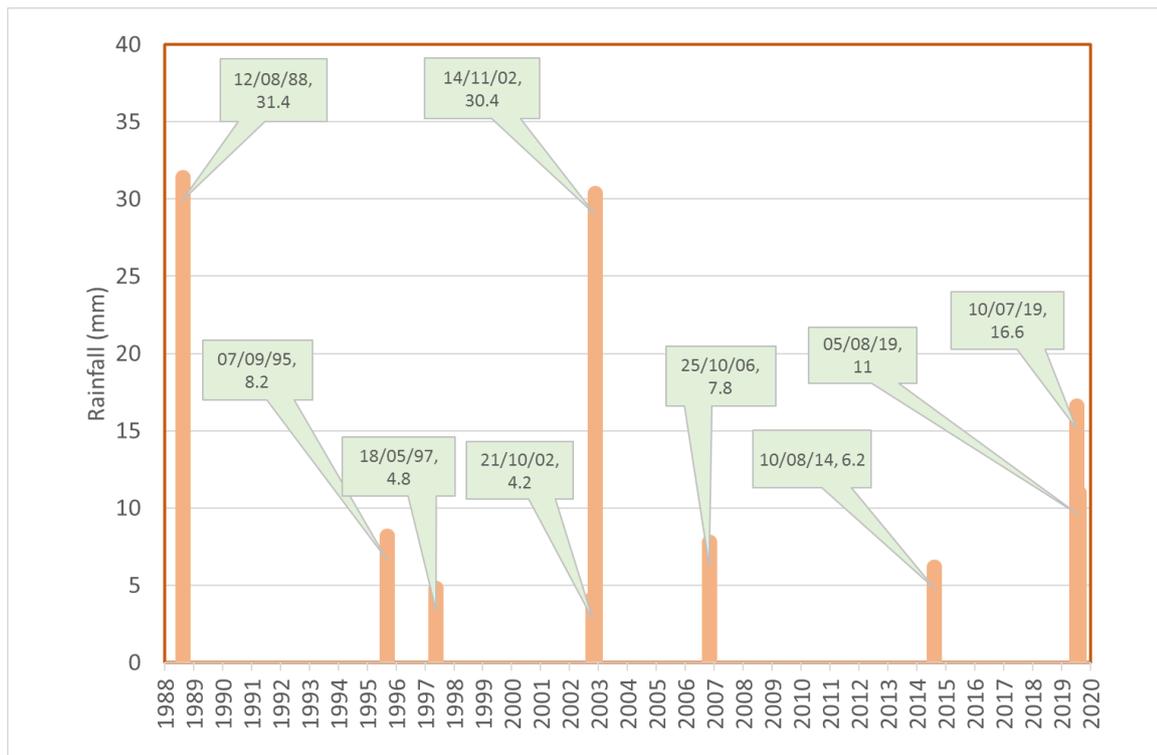


Figure 8: Dingwall 1 hour maximum Rainfall for 8 events given in Graph 1



Rainfall and Flooding

This report focuses on the rainfall for selected events recorded as a quantity of rain that falls in a standard time period, this enables comparisons between events. Flooding occurs when rainfall falls with sufficient intensity that the normal drainage paths are overwhelmed; these paths can be whole catchments such as the Knockbain Burn or River Peffery, or on a much smaller scale impacting individual streets, houses and gardens. Longer duration rainfall over a wide area leads to catchment wide and river flooding, shorter duration rainfall such as that associated with thunderstorms can be much heavier and more localised. For the latter and for really intense short term rainfall, even where the total volume is relatively low, as was observed in Dingwall, this can result in surface flows that local overwhelm local urban drainage. To understand the detail of the impact mechanisms of these storms on the urban drainage in Dingwall is beyond the scope of this note.

Instrumentation

SEPA's rainfall gauge is designed and calibrated to meet Met Office Standards. It measures both rainfall intensity and volume. It is located at the Ambulance Depot on Strathpeffer Road. SEPA has two river gauging stations on the Peffery; the upper gauge just downstream of Strathpeffer Sewage works, records level which is calibrated to flow. The second at Peters Bridge in Dingwall only records level. All the data is accessible via telemetry, see <https://apps.sepa.org.uk/rainfall> and <http://apps.sepa.org.uk/waterlevels/>

Summary of Graphs and tables.

Individual rainfall and river level responses are given in figures 3, 4 and 5 for the 10th of July and 5th of August 2019 and the 25th and 26th of October 2006. In addition figure 6 compares the rainfall rate and 15 minute totals for the 5th of August 2019

Table 1 shows the Dingwall Rainfall for the top 7 24 hour rainfall events since 1985 plus events for July and August 2019. This is plotted for the 24 hour rainfall in Figure 7 and for the 1 hour rainfall in Figure 8.

Key Points

- In terms of Rainfall, for the duration intervals described, neither of the 2019 rainfall amounts are exceptional. Both were a result of convectional rainfall from thunderstorms. On the 6th of July 2019 the storm showed three distinct pulses of heavy rain, on the 5th August 2019 the rainfall was a single very intense downpour.
- For the 24 Hour rainfall total, the total on 10th of July would now rank as the 7th highest recorded since 1985. The total on the 5th of August has a 20% chance of occurring each year.
- For the 1 Hour Rainfall the total on 10th of July would now ranks as the 3rd highest recorded since 1985 and the 5th of August the 4th Highest.
- River levels for the Peffery at Strathpeffer and Peters Bridge (which shows the tidal peaks) on both the 10th of July and 5th of August 2019 were not out of bank.
- On the 5th of August, the thunderstorm began with a very short period of very intense rainfall, with a rate of up to 120mm per hour (albeit for under a minute!), there was also a period of hail.
- The most extensive flooding in recent years occurred on the 26th of October 2006, this was a combination of heavy rain caused by an active weather front over a prolonged period and also overtopping from the River Peffery. Again the rainfall that led to this was not exceptional, with annual probability of exceedance greater than 10%.
- SEPA would welcome any reports of flooding that may have occurred during any events with higher rainfall; most notably on the 12th of August 1988.

For further information please contact

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