

Information pack for Helen Morgan MP for flood meeting and tour on 24 February 2022

Flooding has affected the local floodplains for centuries but seems to be increasing in frequency and severity. Maesbrook and Meverley are usually affected several times a year but a Pentre flood is rarer. This is the now the fourth time in two years that Pentre has been flooded to some depth. The last previous Pentre flood had been in 2000.

The River Severn Partnership (RSP) and the Severn Valley Water Management Scheme (SVWMS) are seeking holistic flood alleviation measures and are expected to announce their initial ideas in early-mid 2022 (Strategic Outline Case). There was a scheme announced in autumn 2020 for a dam linked with the river crossing of the proposed North West Relief Road but this has now been “parked”, following stiff local opposition from people like us north of Shrewsbury, who were greatly alarmed by the idea.

SVWMS said a year ago that they were looking at investigations into Natural Flood Risk Management (NFM), land management practices, reservoir operation and storage options. They said it was inevitable that long-term alleviation will involve engineered solutions across parts of the catchment. That probably means dams somewhere, possibly on the English side of the border.

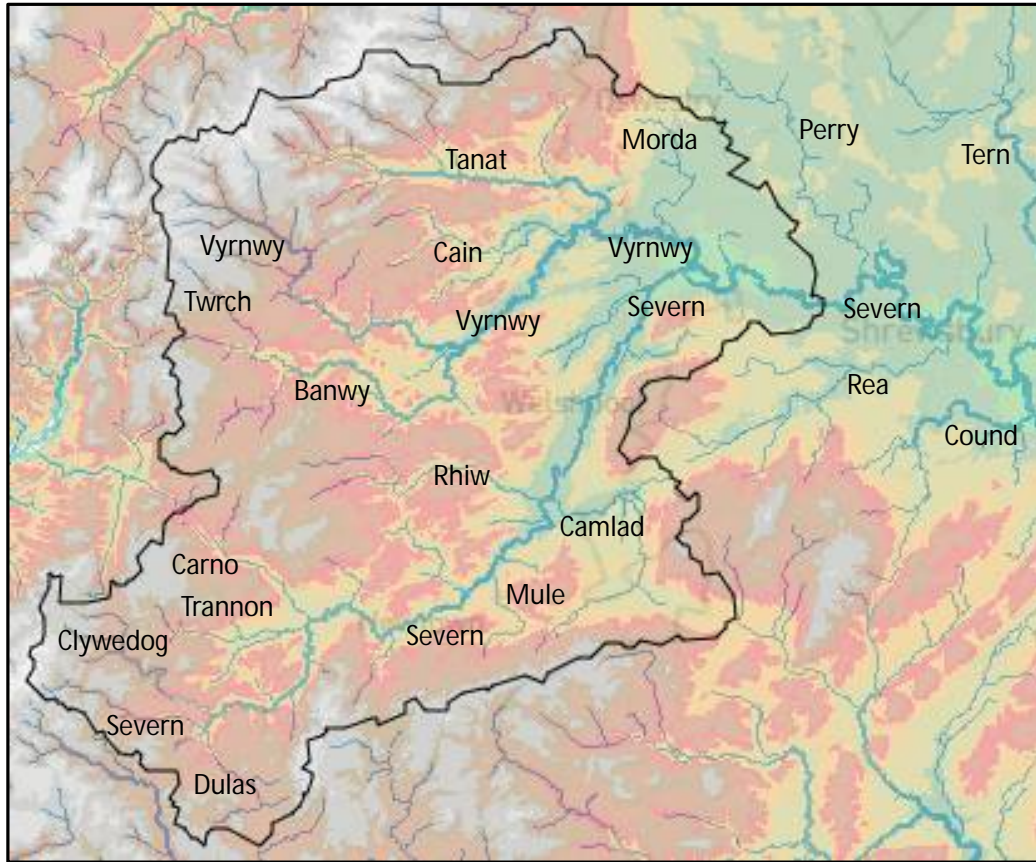
This pack gives further information on the catchment area of the waters that flow into our Severn/Vyrnwy confluence floodplain, its rainfall, the river flows and levels, the flood defences and previous ideas that have been aired.

People likely to be affected by flooding (including many farmers who need to move livestock) sign up for EA flood alerts and flood warnings. They also keep their eyes on the river levels via the internet. People who expect to be cut off by road park their cars above the flood line ahead of the flood and then walk or wade to them after it comes. Householders variously deploy private argaes and flood gates, and sandbags and pumps to help keep the flood out. This time, some people had to be evacuated by the rescue services for medical reasons. Shropshire Council’s emergency planning team have proved very helpful.

Locals try to keep informed about the latest plans of the various agencies, but with conflicting aims for England and Wales, between Parish Councils and local Flood Forums/Action Groups and even between parliamentary constituencies, perfect liaison is proving difficult.

There is more information on the Kinnerley Parish Council Flooding webpage at <https://www.kinnerleyparishcouncil.org.uk/flooding> , particularly the 11 February 2021 presentation and the information provided for the tour on 13 May 2021 with Owen Paterson MP, Environment Agency staff and Severn/Vyrnwy confluence constituents.

The "Severn Upper" Catchment Area



The named rivers in the catchment to the Severn/Vyrnwy confluence at Molverley and beyond



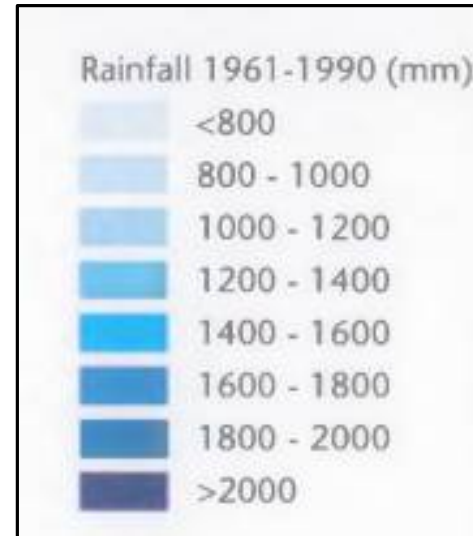
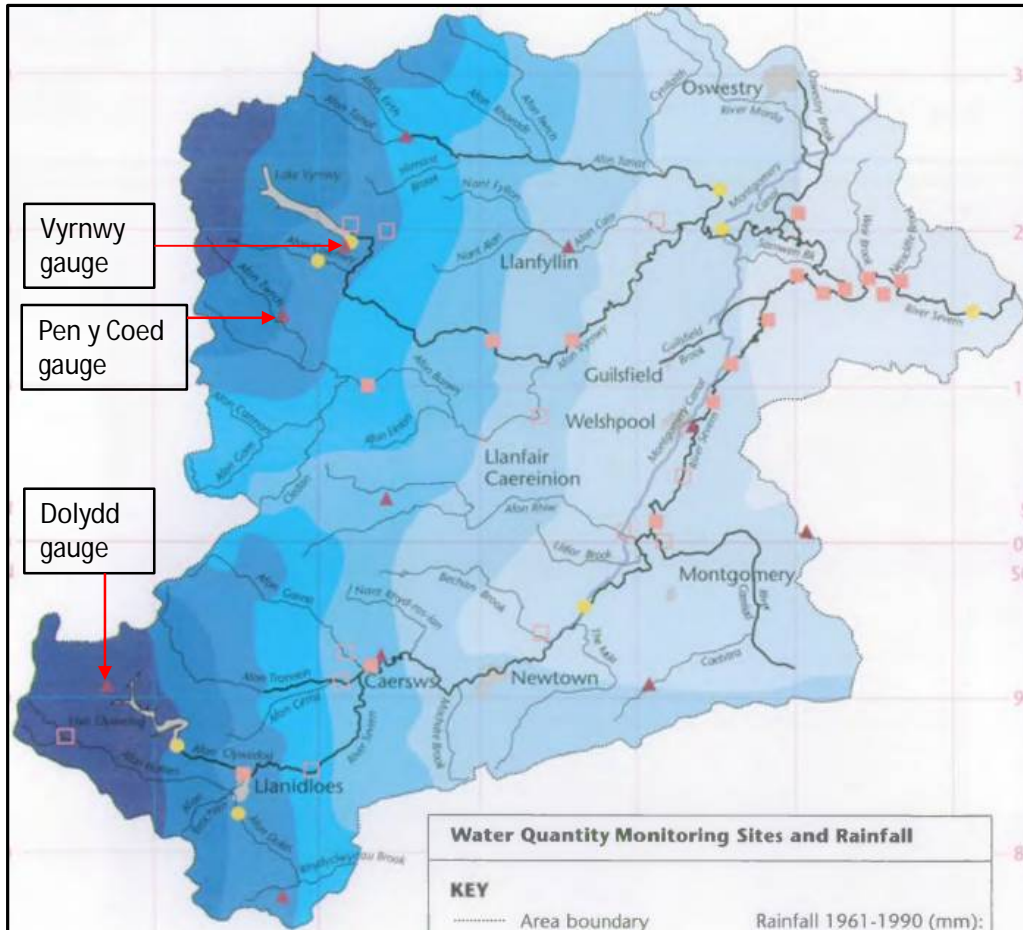
That same EA Severn Upper catchment area showing the monitoring stations, and the England/Wales border

Severn Upper catchment area		
	Catchment hectares	
Vyrnwy	89,727	44%
Severn	113,194	56%
Total Severn/Vyrnwy to Montford	202,920	100%
Shropshire Council area	319,711	
RSP claimed opportunity for agricultural land of:	1,000,000	
Total agricultural land in England	8,313,215	

It's not the areas, it's the rainfall that matters. That rainfall is not necessarily proportional to the above areas.

RSP's claims of benefit appear to be inflated.

Rainfall



It's not the averages that cause floods

2,000mm per year = 5.5mm per day.

Storm Franklin dumped 113mm at the Pen y Coed gauge in the 24 hours of Sun 20 Feb 2022.

100mm (4 inches in 24 hours) will cause a flood

What has changed as a result of Climate Change?

Predictions are for an average rise of up to 1m in levels but, again, it's not averages that matter

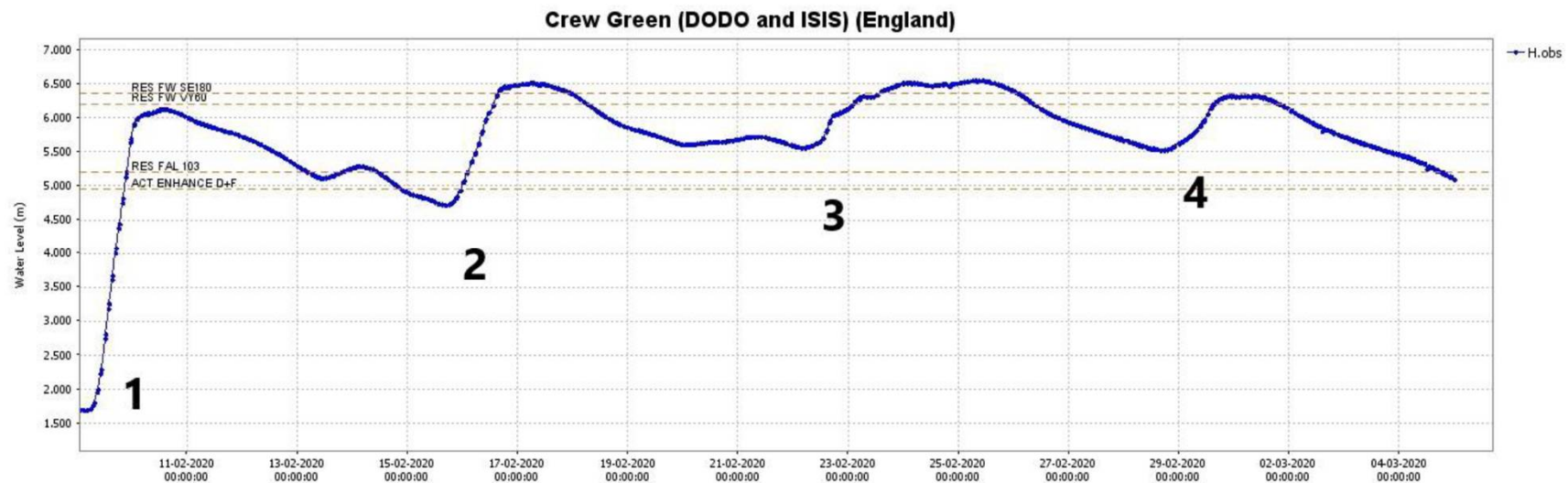
The EA say the river system is now responding differently and the modelling can't rely on history

A wet catchment has less chance of holding up heavy rainfall. So successive heavy rains = a big flood, giving

Flood on flood on flood on flood

The graph below is from Shropshire Council's inquest into the 2020 floods at the confluence

(8 December 2020 report to Communities Overview Committee)



1. Storm Ciara
8 - 9 Feb 20

2. Storm Dennis
15 - 16 Feb 20

3. Heavy rain
21 - 24 Feb 20

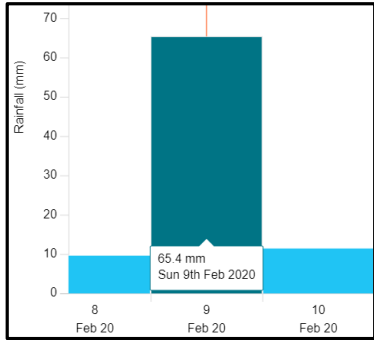
4. Storm Jorge
28 - 29 Feb 20

Rainfall - Vyrnwy rainfall gauge

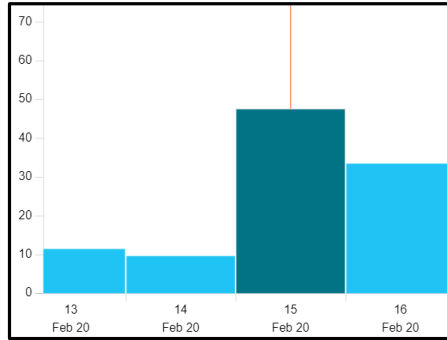
<https://rivers-and-seas.naturalresources.wales/Station/1148?>

These charts show the rainfall amounts during the 2020, 2021 and 2022 named storms

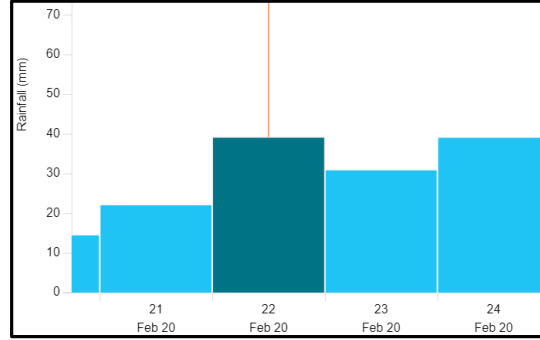
The Vyrnwy rain gauge recorded 515mm of rainfall in Feb 2020 making it the wettest Feb there since records began in 1908



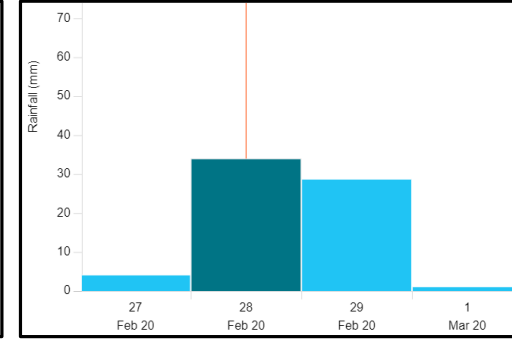
Ciara, 8-9/2/20, 65.4mm



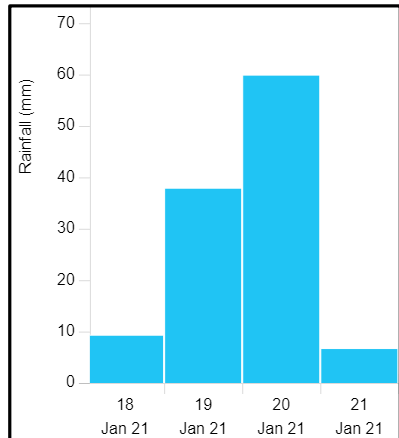
Dennis, 15-16/2/20, 81.2mm



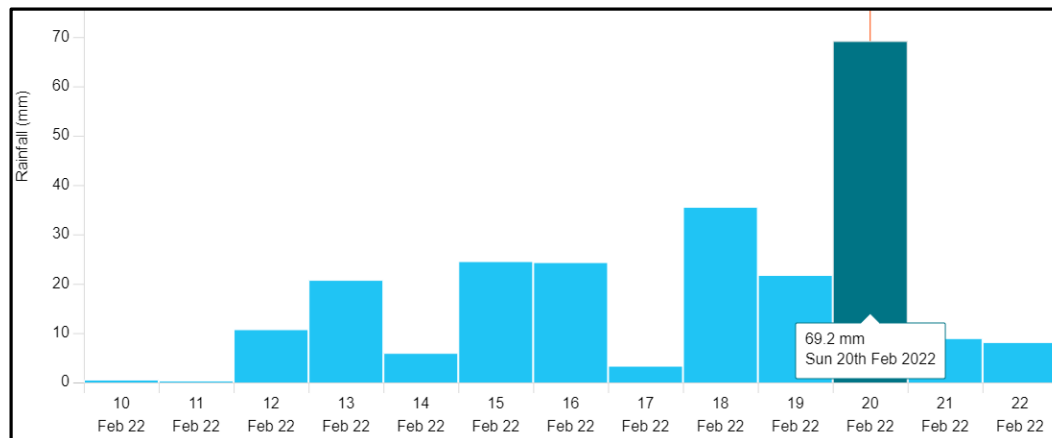
Heavy rain, 21-24/2/20, 131.6mm



Jorge, 28-29/2/20, 62.8mm



Christoph, 19-20/1/21, 98mm

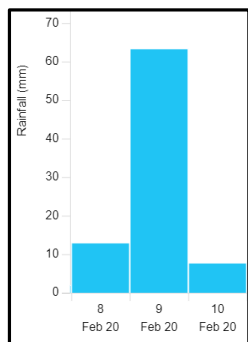


Dudley 16-17/2, Eunice 18/2 and Franklin 20-21/2/22 = 217mm in 9 days

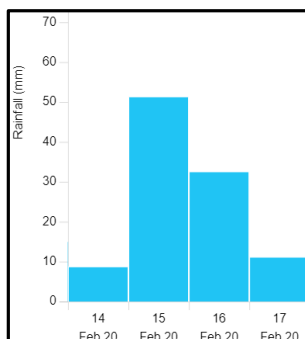
Rainfall - Dolydd rainfall gauge

<https://rivers-and-seas.naturalresources.wales/Station/1139?>

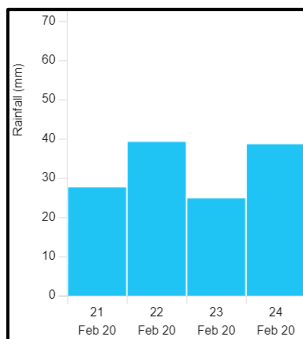
These charts show the rainfall amounts during the 2020, 2021 and 2022 named storms
 Ciara's rainfall was most intense over North Wales; Dennis's was worse in South Wales



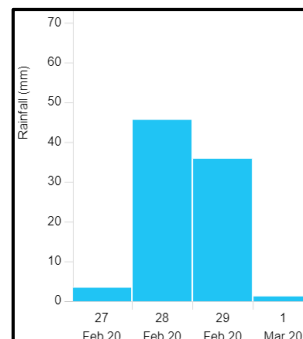
Ciara, 8-9/2/20, 63.4mm



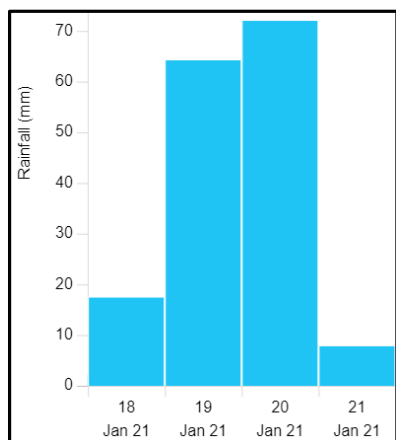
Dennis, 15-16/2/20, 84mm



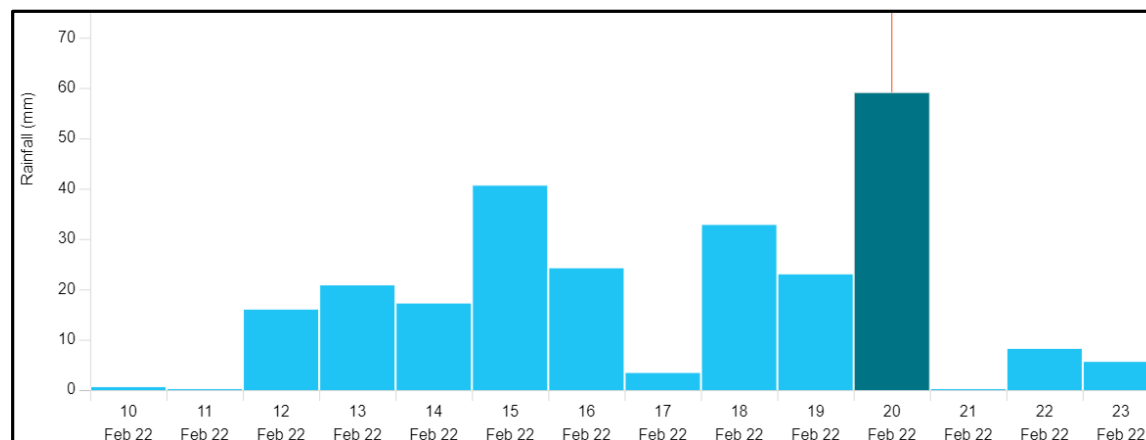
Heavy rain, 21-24/2/20, 131mm



Jorge, 28-29/2/20, 81.8mm



Christoph, 19-20/1/21, 136.6mm

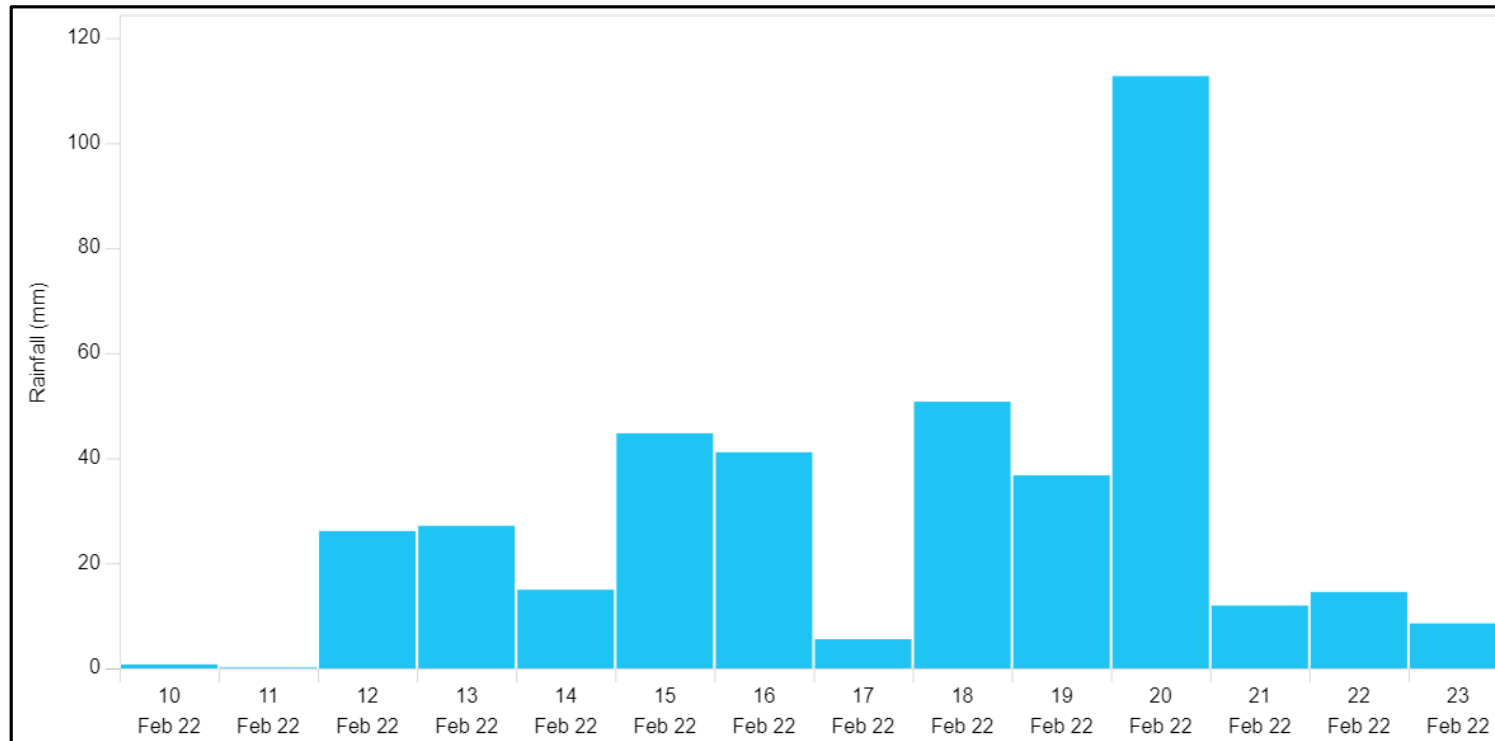


Dudley 16-17/2, Eunice 18/2 and Franklin 20-21/2/22 = 239mm in 9 days

Rainfall – Pen y Coed rainfall gauge

<https://rivers-and-seas.naturalresources.wales/Station/1144?>

This chart shows the rainfall amounts during the 2022 named storms

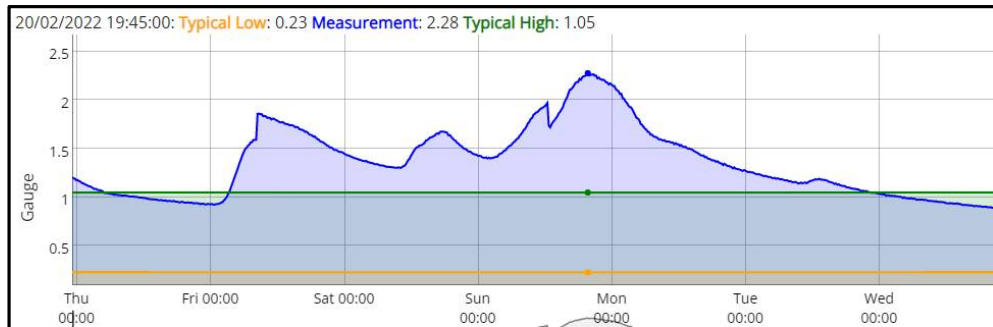


Dudley 16-17/2, Eunice 18/2 and Franklin 20-21/2/22 = 362mm in 9 days

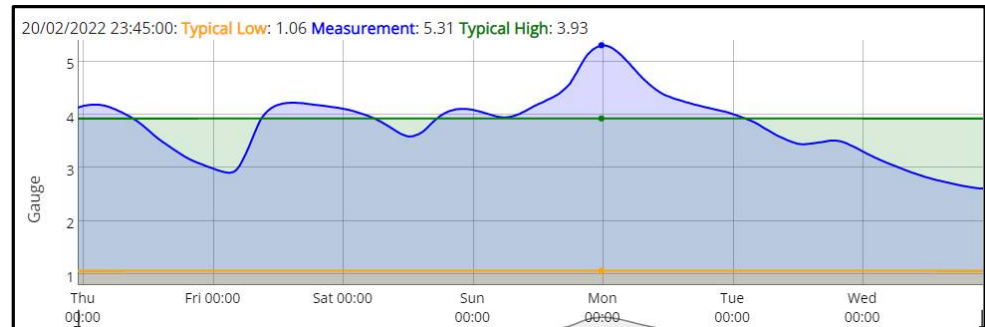
Peak river levels after storm Franklin

<https://riverlevels.uk>

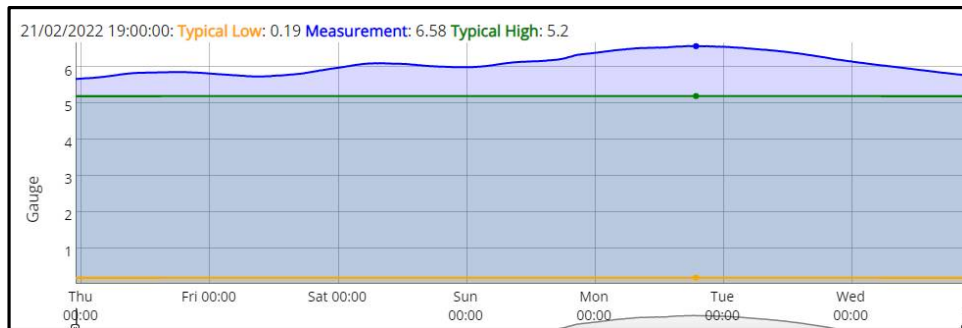
A selection of levels in the North Shropshire constituency, showing the timings of the peaks (which are also identified by the dots). Flooding is expected when levels are above the green line. The peaks on the Tanat and Vyrnwy are more pronounced than those on the Severn. The levels in most places were the highest yet. Previous peaks were decades apart.



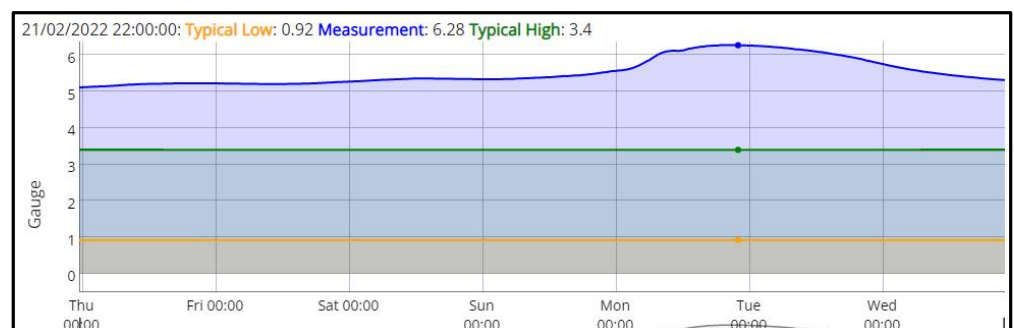
Tanat at Llanyblodwel – highest level 2.68m, 6th August 1973



Vyrnwy at Llanymynech – previous high 5.19m, 6th February 2011



Severn at Crew Green – previous high 6.57m, 31st October 2000



Severn at Cae Howel – previous high 6.26m, 25th February 2020

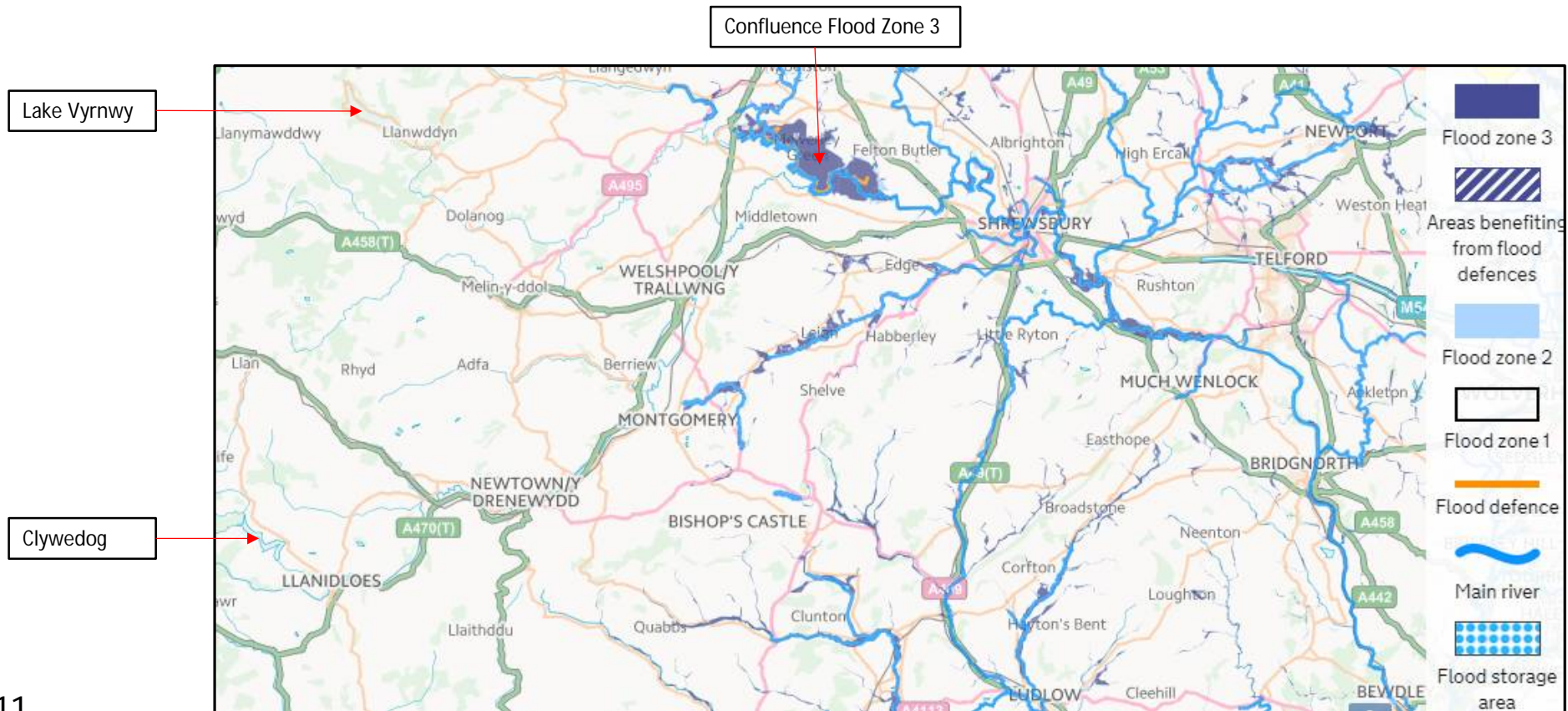
Timings of flows after storm Franklin

Time from Sunday 20 Feb 2022	Event
3pm Sunday	Storm rains completed in the hills
6pm Sunday	Both Vyrnwy and Clywedog dams at peak overflow
Midnight Sunday	Peak level on Vyrnwy at Llanymynech
3am Monday	Maesbrook gauge peaks
12 noon Monday	Buttington gauge on the Severn peaks, 12 hours after Llanymynech.
7pm Monday	Crew Green gauge peaks, 19 hours after Llanymynech
9pm Monday	Cae Howel gauge peaks, 21 hours after Llanymynech

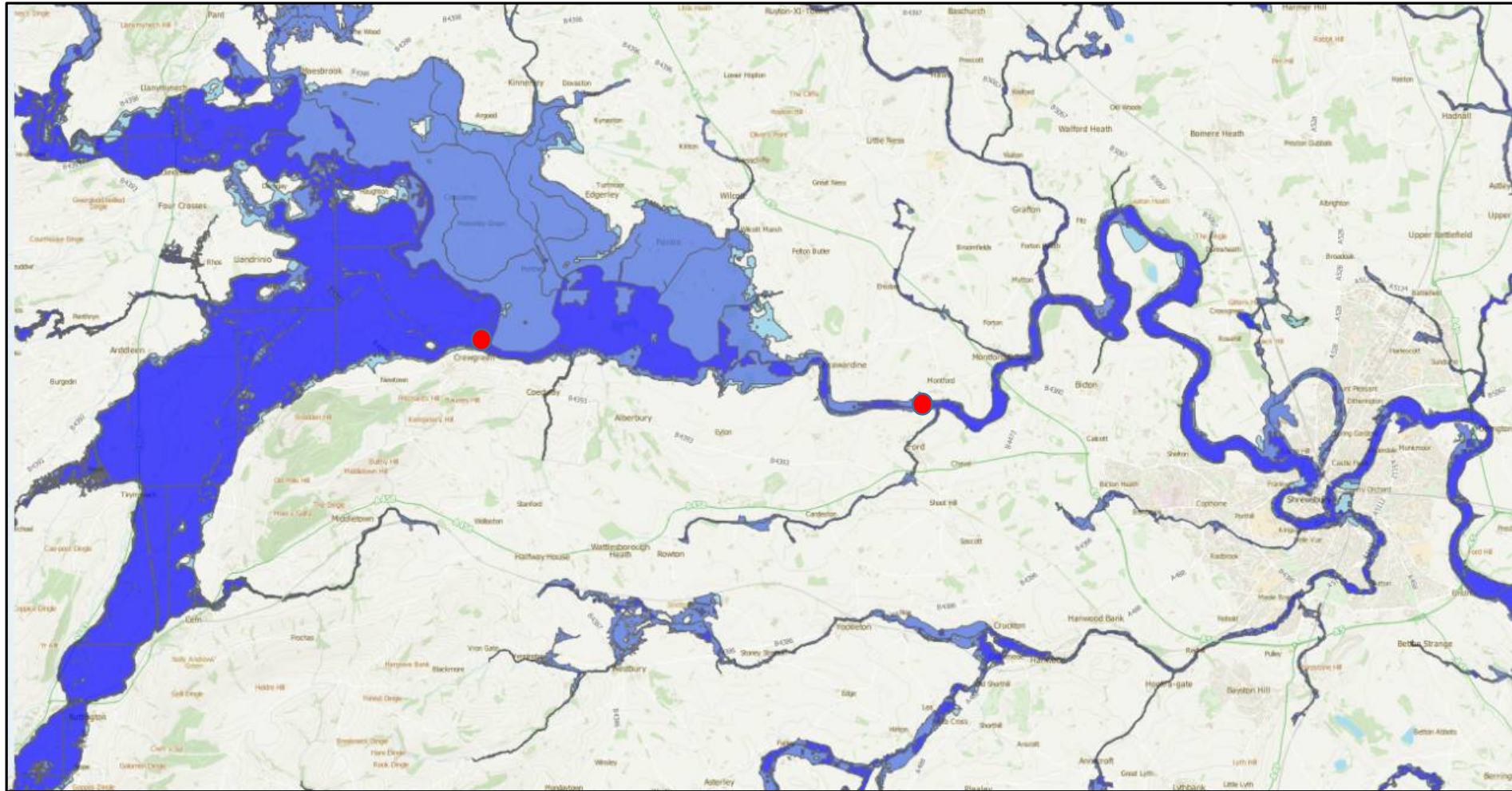
Each flood can be different, depending on where the rain falls, how fast it comes down (which can depend on the preceding ground conditions) and how full the confluence “pond” already is

Both the Vyrnwy and Severn can exceed 600 cumecs of flow (1 cumec = a cubic metre (or a tonne) of water per second), and they converge at Crew Green/Melverley. The water flows down in waves through the natural gorges, spreading out and pinching in again. Our 'stage' is effectively from Shrawardine upstream to Llanymynech on the Vyrnwy and to Pool Quay on the Severn. The water backs up (or "ponds") from the pinchpoint in the gorge at Shrawardine/Montford. It is all the result of Ice Age geology.

This map shows the two dams but it is an EA map and therefore shows only the English Flood Zones



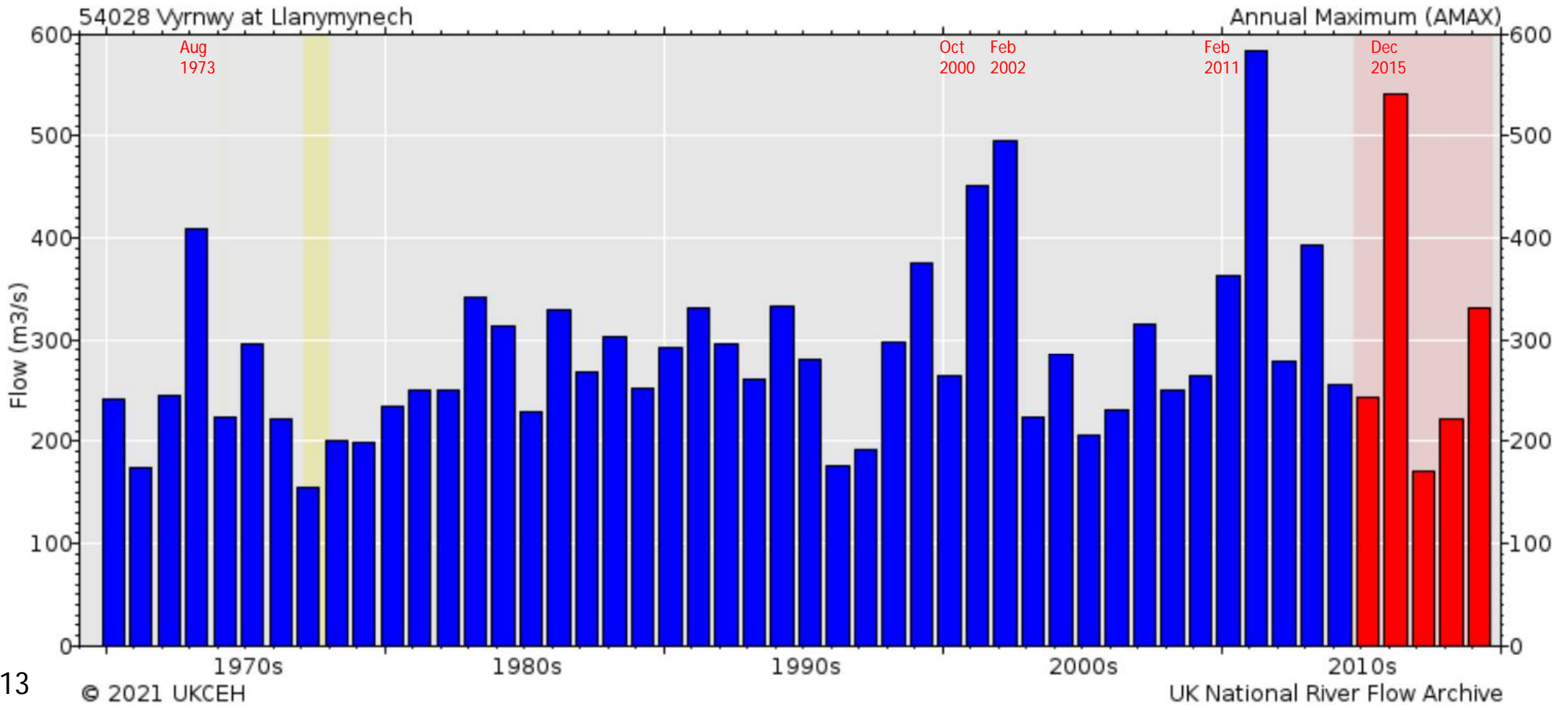
This flood risk map shows the combined England/Wales picture. The red dots show the locations of the Crew Green and Montford gauges



There are now four charts showing such history as there is for annual peak flows, highlighting the big floods (the more recent ones are not shown). Flow data is available only at a few points on the system. The first two charts are upstream of our "pond", the second two are after.

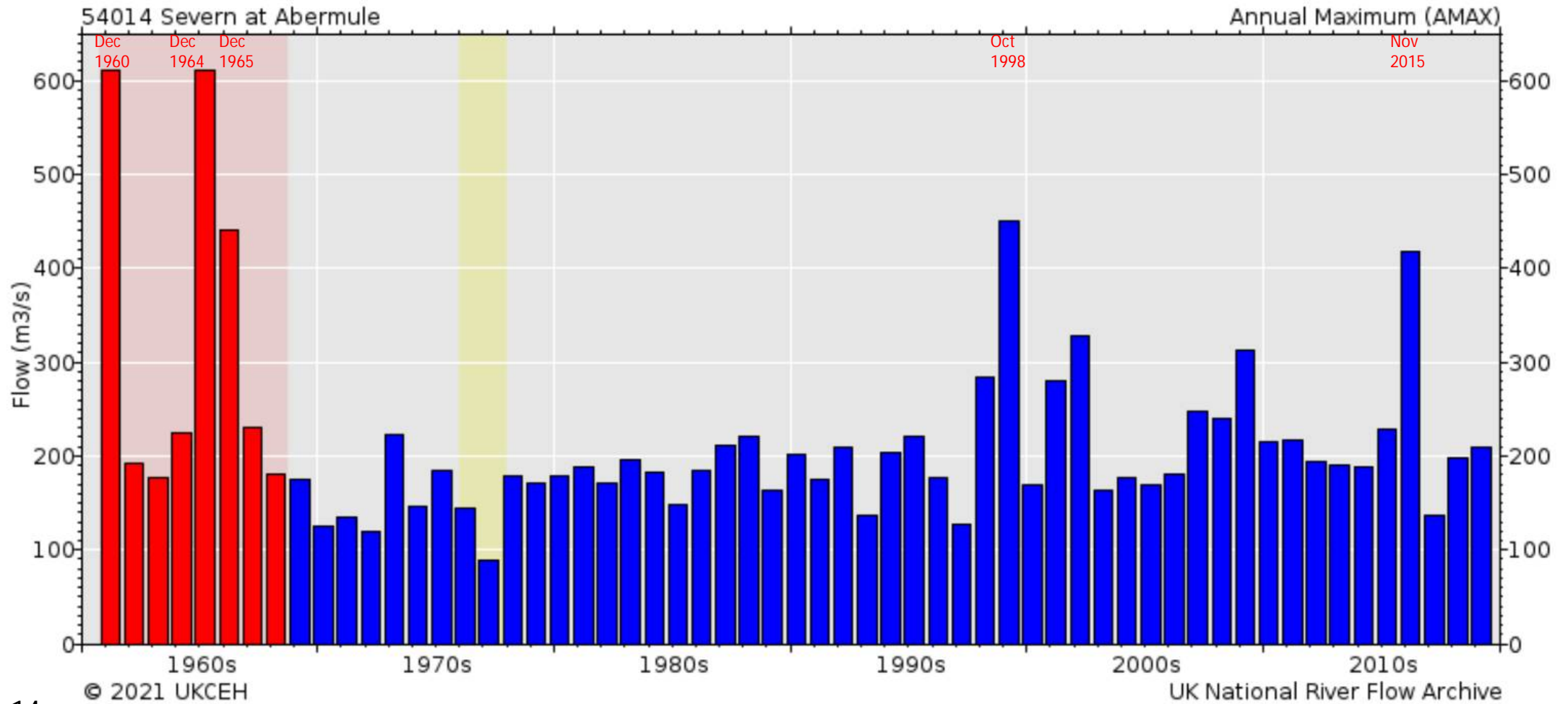
Vyrnwy at Llanymynech

Annual peak flow data <https://nrfa.ceh.ac.uk/data/station/peakflow/54028>



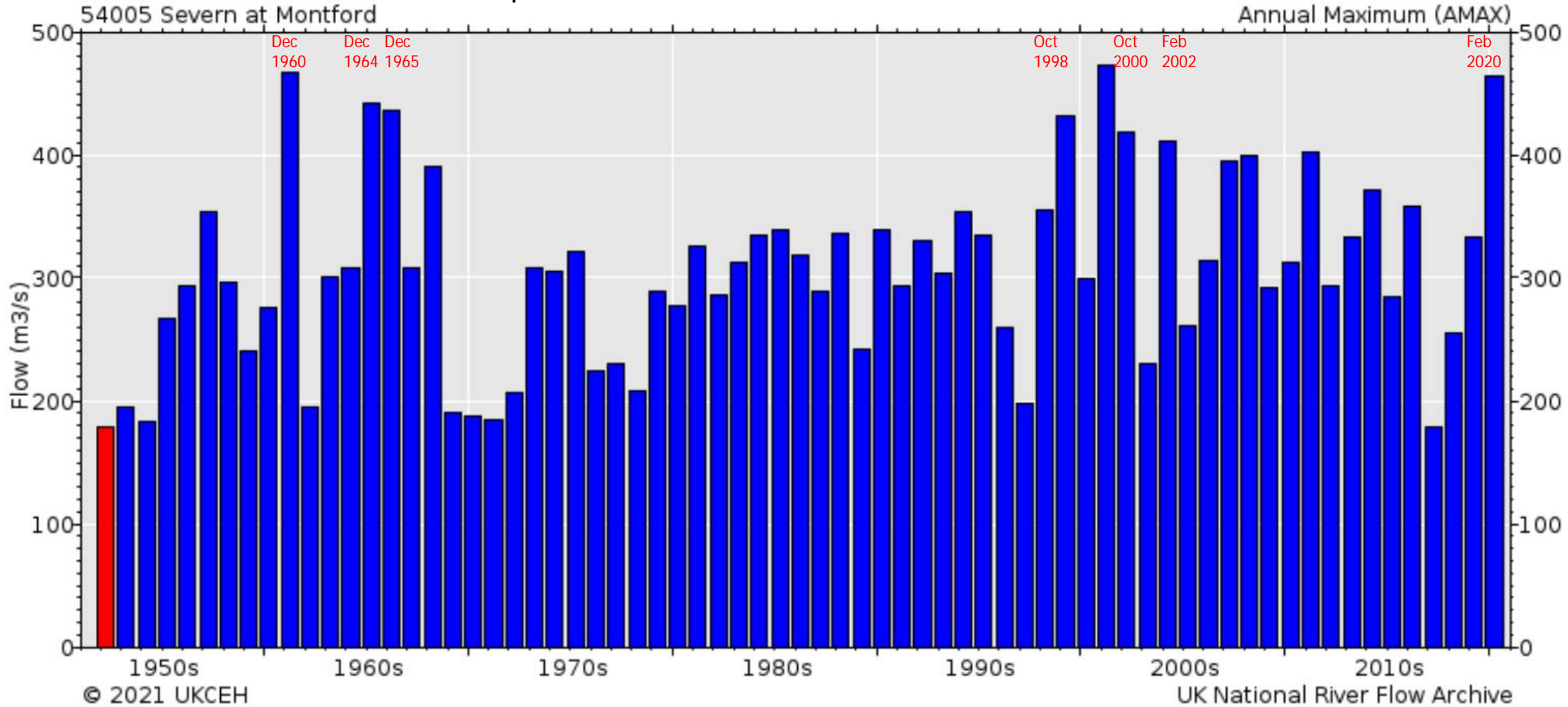
Severn at Abermule

Annual peak flow data <https://nrfa.ceh.ac.uk/data/station/peakflow/54014>



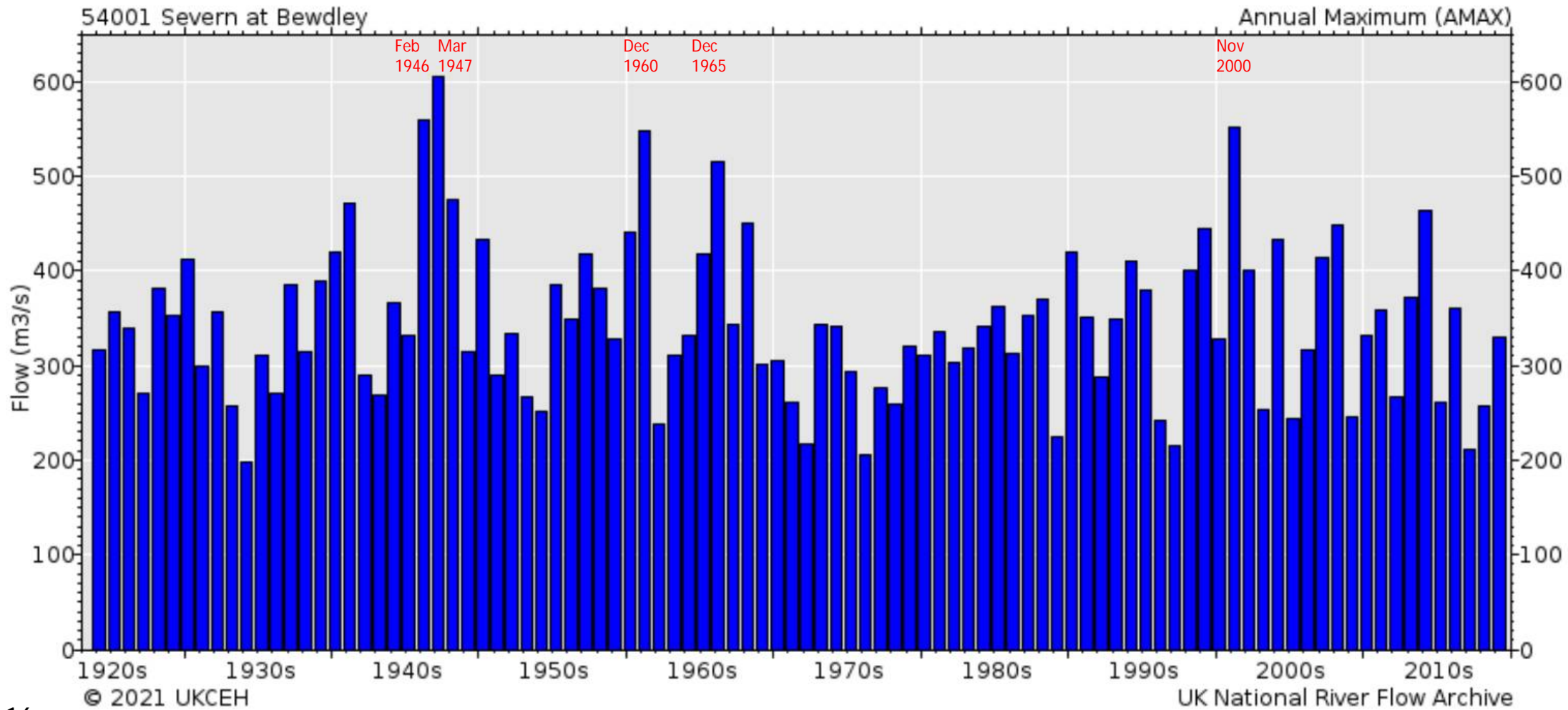
Montford is a pinch point

Annual peak flow data <https://nrfa.ceh.ac.uk/data/station/peakflow/54005>



Severn at Bewdley

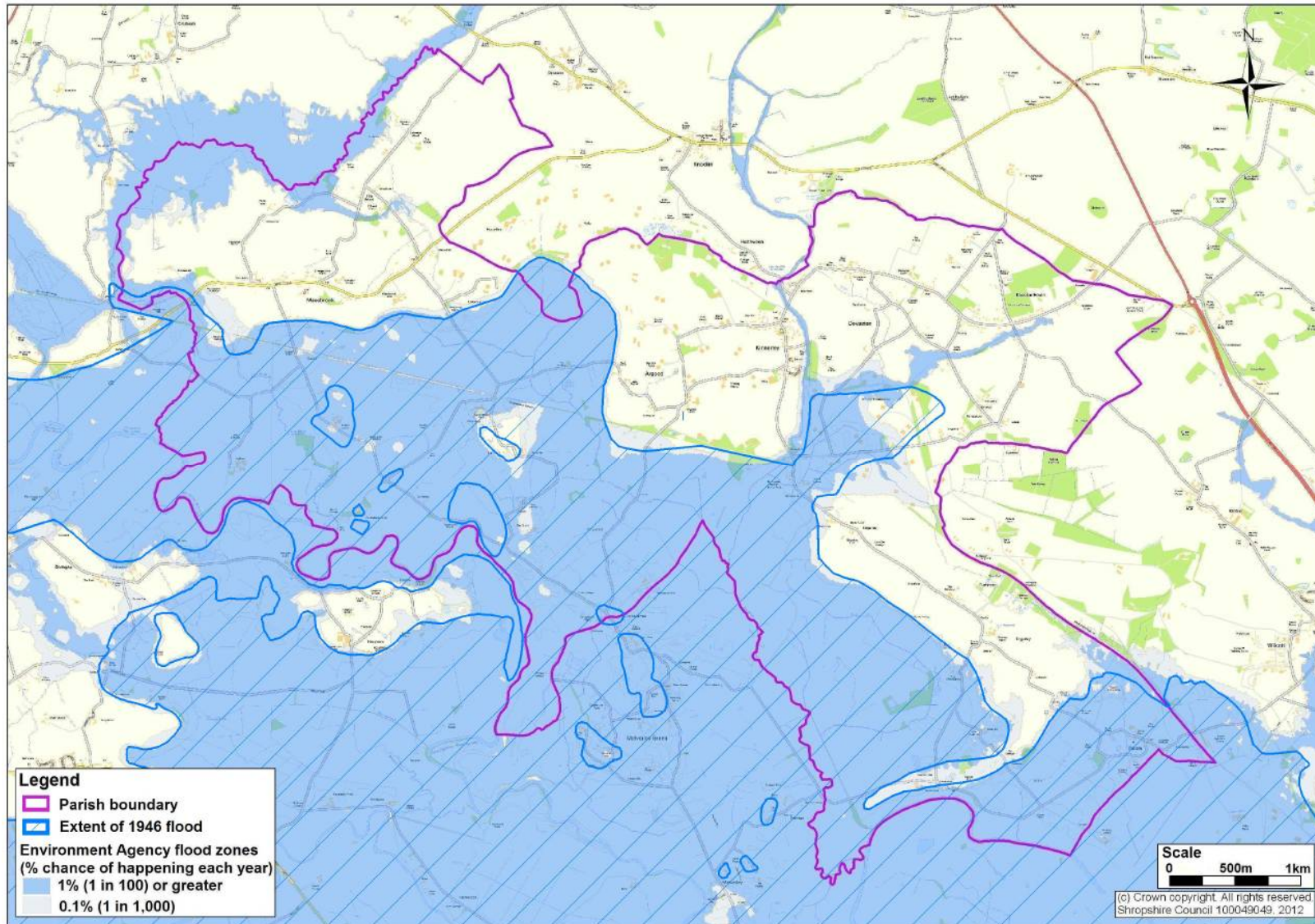
Annual peak flow data <https://nrfa.ceh.ac.uk/data/station/peakflow/54001>



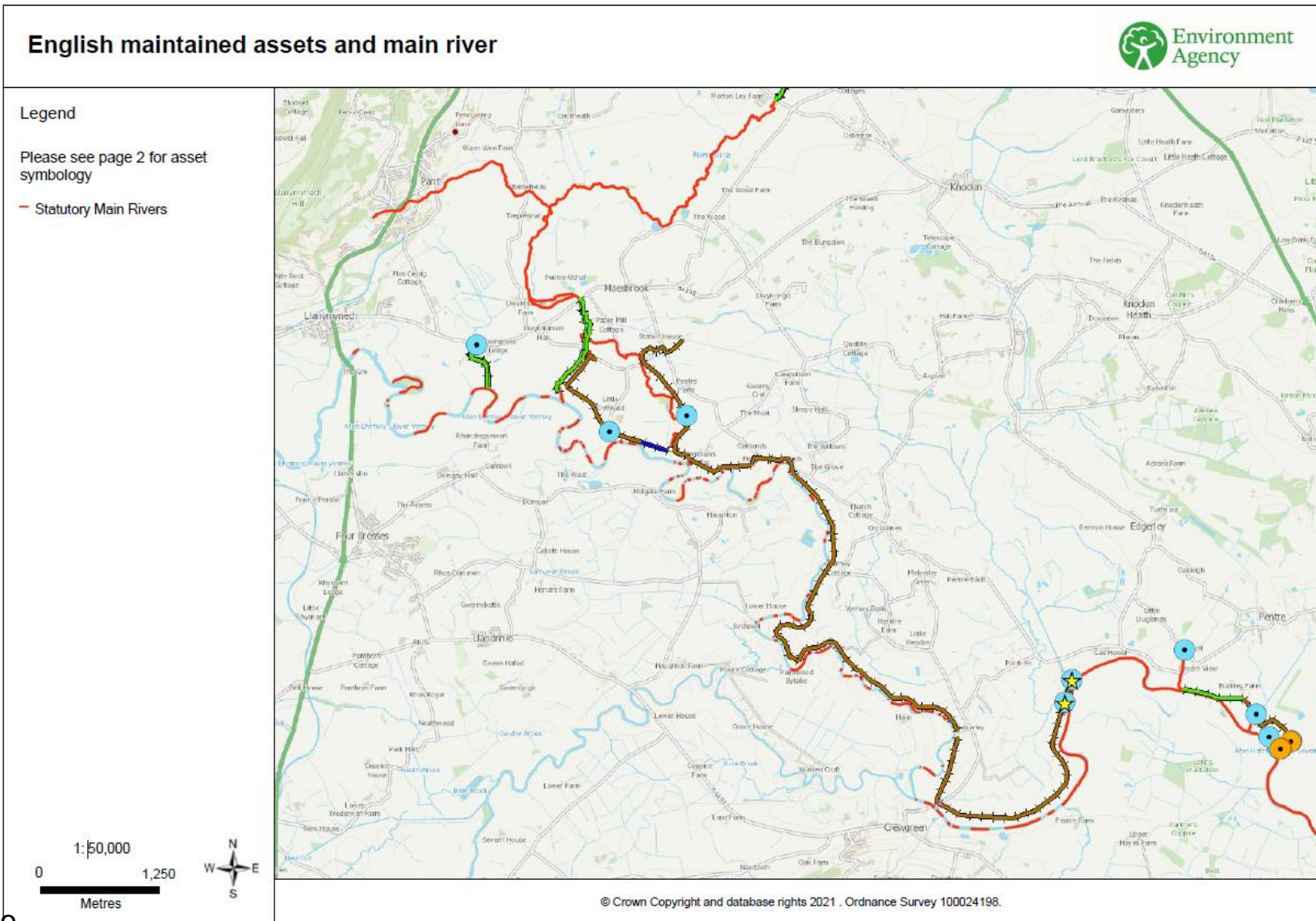
And this is the “pond”! Aerial photograph of February 2020 flooding, taken over the Royal Hill



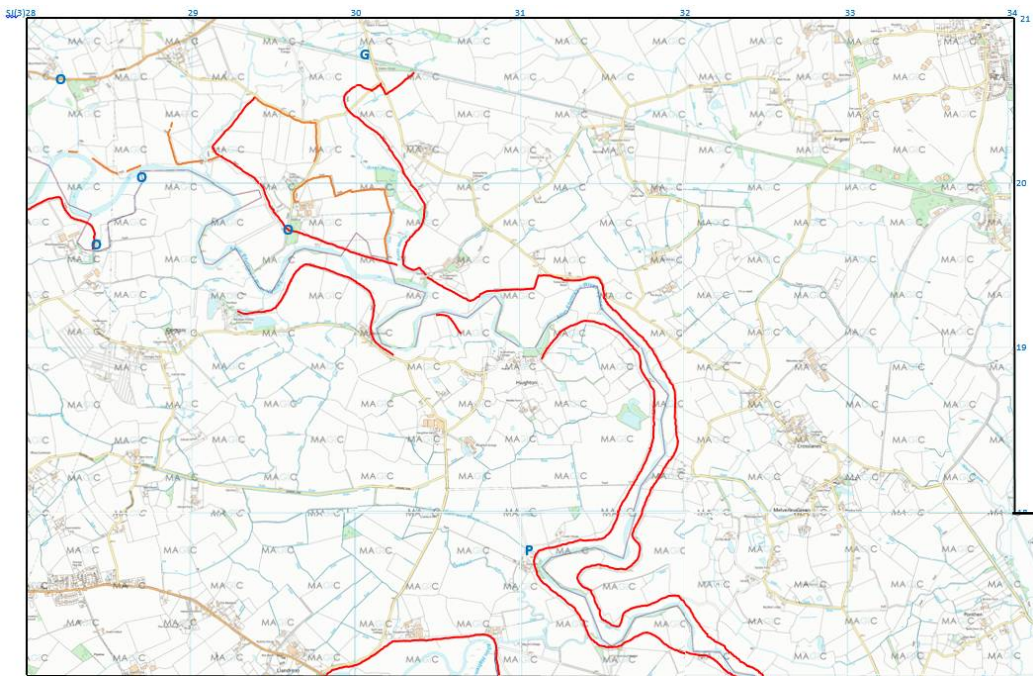
Extent of February 1946 flood



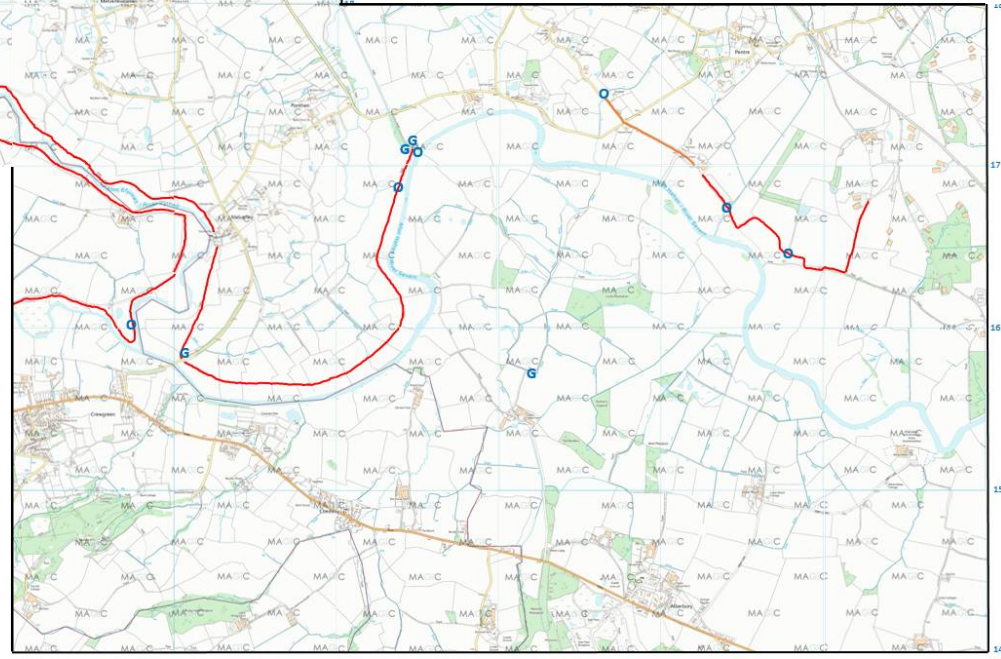
Environment Agency map of 'assets' - English side of river only (received 1/3/21)



- Defences**
- Embankment
 - Wall
 - Flood Gate
 - Demountable defence
 - Bridge abutment
 - High Ground
- Structures**
- Control Gate
 - Draw Off Tower
 - Fish Pass
 - Hydrobrake
 - In Channel Stoplogs
 - Inspection Chamber
 - Jetty
 - Outfall
 - Screen
 - Spillway
 - Stilling Basin
 - Weir
- Instruments**
- Active Monitoring
 - Passive Monitoring



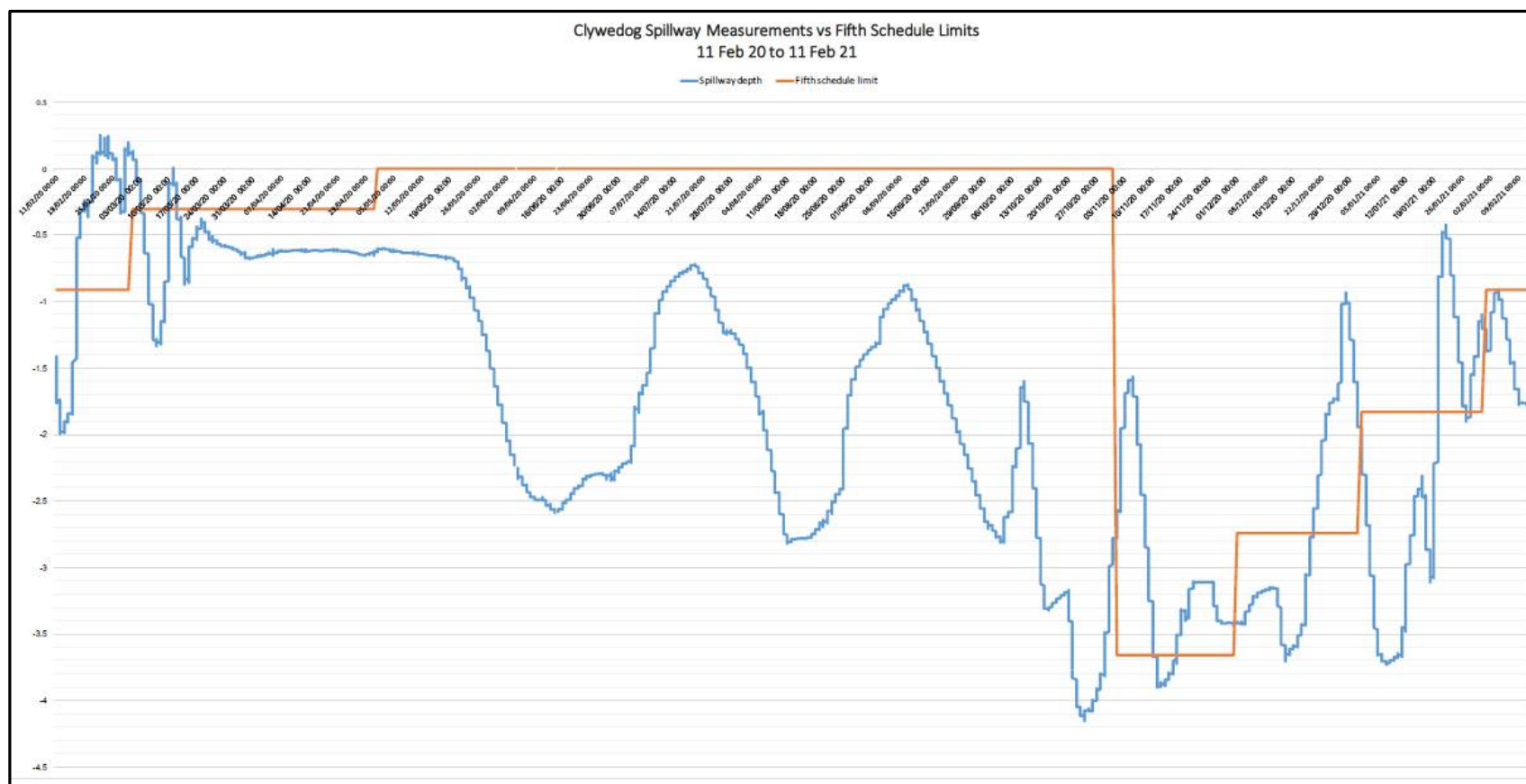
These two sheets of Severn / Vyrnwy confluence flood defences were produced by us in order to show the defences both sides of the border (the EA's preceding map shows only the English side). The water knows no boundaries and EA and NRW need to work together. There is doubt that their liaison is effective.



— EA/NRW maintained areas — Other areas influencing flooding
○ Outfall / sluice doors G Gauge P Pumps

One continual criticism of EA/NRW liaison is over the management of the two main reservoirs, particularly Clywedog. It was built in the 1960s, after the disastrous 1960 flood, for control of the Severn, including flood alleviation. Levels are dictated by Act of Parliament. It appears the need for drinking water for the West Midlands, extracted at Bewdley, takes precedence over flood control measures. Releases of water from Clywedog are sometimes made (in order to keep levels down) which appear to swell the Severn and to hamper the getting away of the early Vyrnwy water. The Vyrnwy reservoir supplies water to Liverpool and is less easily managed for flood control.

The chart below compares the actual levels with those required by the Act, in the year running up to the January 2021 flood.



Storage capacities

Three main areas of storage upstream of Shrewsbury which store water during a flood event (Environment Agency: Shrewsbury Flood Alleviation Scheme, March 2001)

- Lake Vyrnwy – 60,000,000 cu m

Built in the 1890s for Liverpool's water supply. 210,000 cu m per day treated at Oswestry en route to Prescot reservoirs

Catchment represents only 4% of the total catchment area to Shrewsbury

25,000 – 45,000 cu m per day of compensation water can be released into the river Vyrnwy

- Llyn Clywedog – 50,000,000 cu m

Built in the 1960s to regulate flow on the Severn

Catchment represents only 1.8% of the total catchment area to Shrewsbury

- Severn/Vyrnwy confluence – 20,000,000 cu m

Held back by sluice gates when the argaes are overtopped

1 cu m of water = 1 tonne

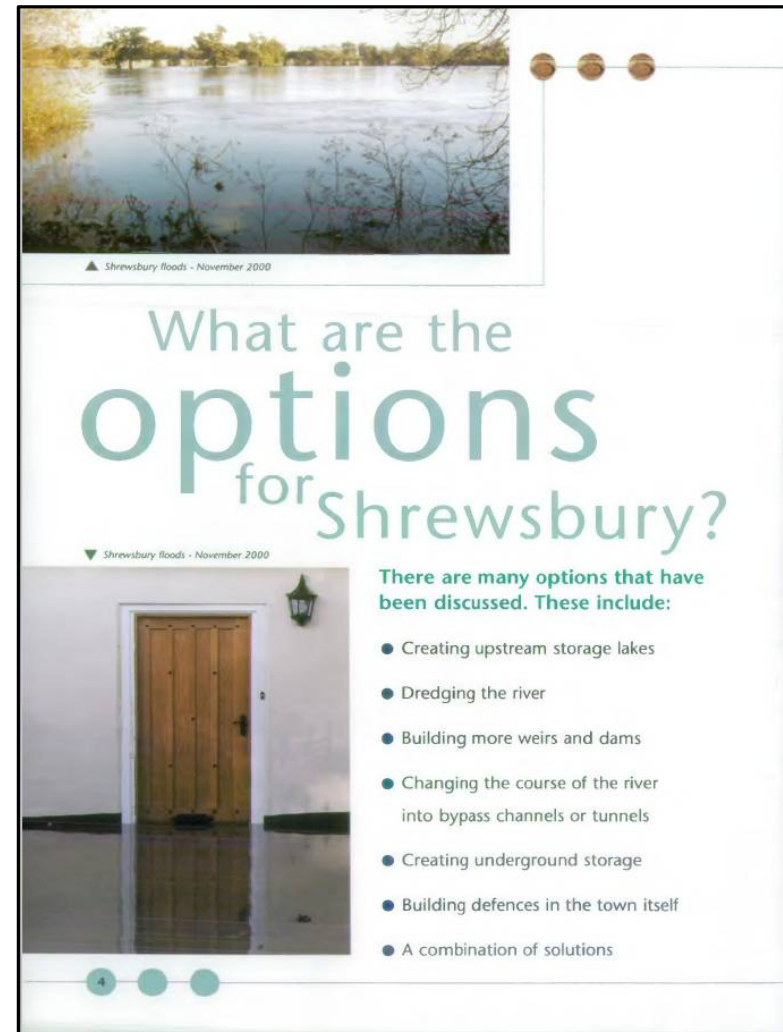
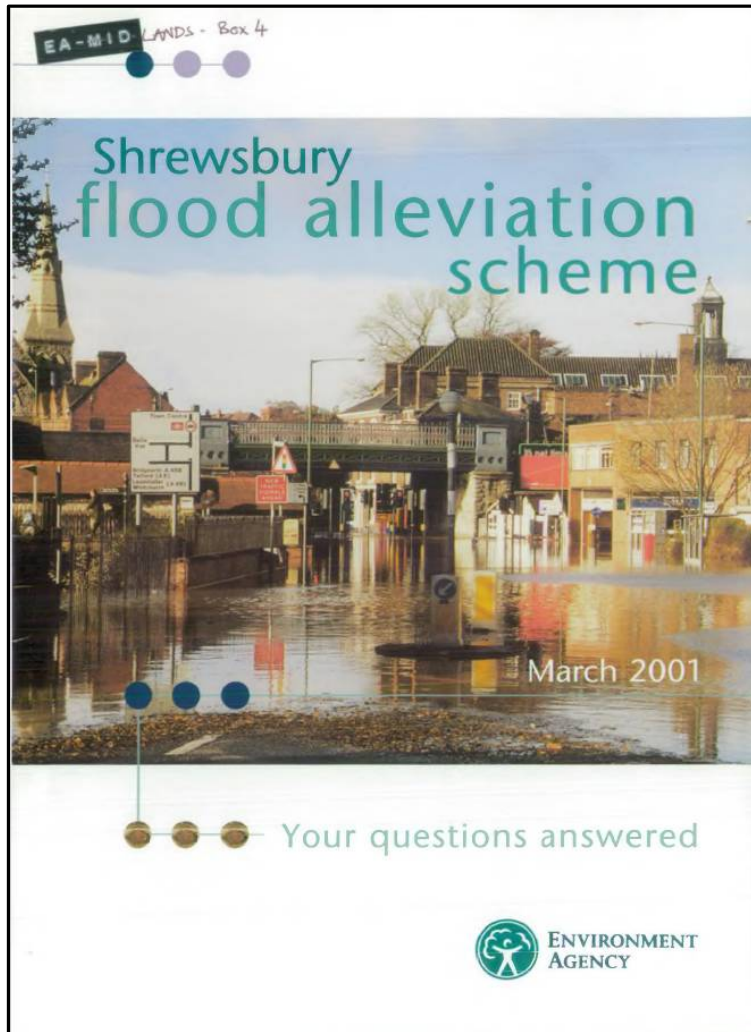
1 cumec = 1 cu m of water per sec, 86,400 cu m per day

450 cumec for a day = 38,880,000 cu m

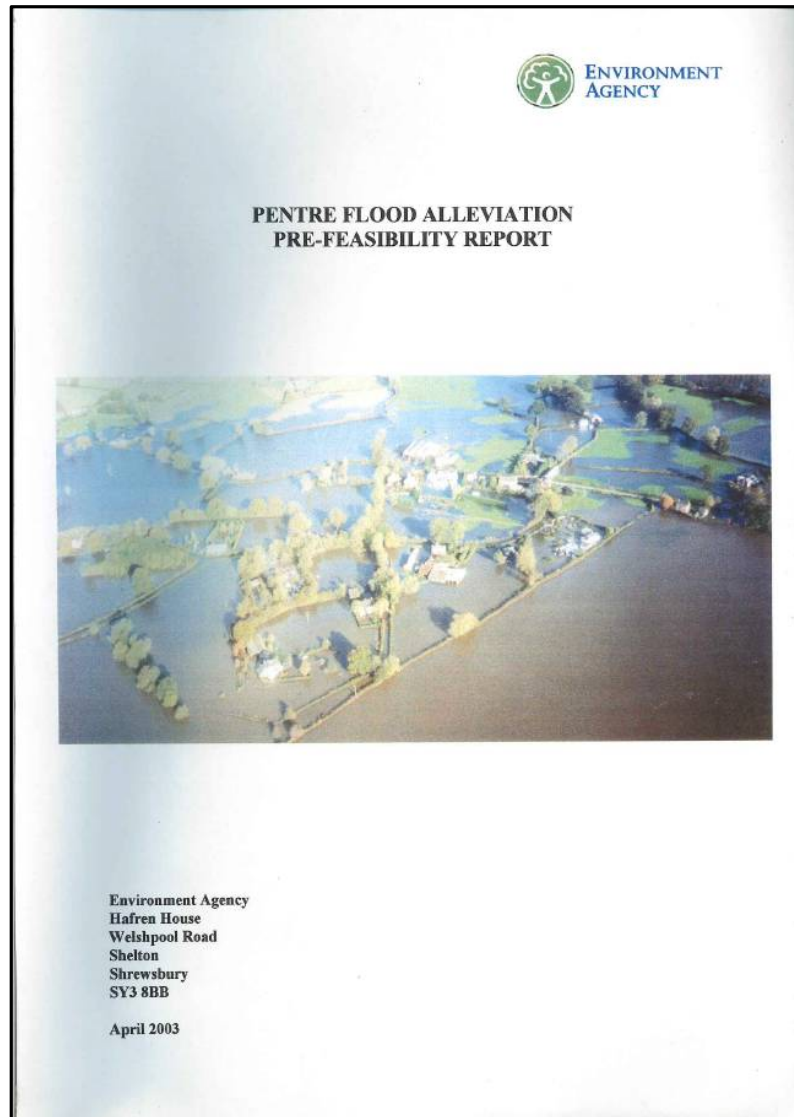
Note: statements from EA report above in red are thought to be misleading:

- %s by area might be right but by rainfall will be much higher
- There are now flap-doors rather than sluice gates

This was the EA report after the 2000 floods, as a result of which the flood barriers in Shrewsbury were built



This is an EA report done for Pentre, again after the 2000 flood, but never acted on. It lists the affected properties.



Properties at Risk	from Appendix V and Appendix VI		
	Indicated Depth of Flooding Autumn 2000		OS benchmark level
	Inches	m	Door step
Stone Cottage	46	1.168	59.37
No 2 Brookside	42	1.067	59.60
Brook Cottage	42	1.067	59.37
No 1 Brookside	36	0.914	59.68
Stone House	36	0.914	59.54
The White House	36	0.914	59.77
Three Oaks	25	0.635	59.73
Hilley Cottage	24	0.610	59.83
Windsor House	22	0.559	59.55
The Red House	18	0.457	59.76
Grove Cottage	15	0.381	59.96
Laburnum House	15	0.381	59.79
The Fields	15	0.381	59.88
Eaton Rise	14	0.356	59.89
Gritte Cottage	14	0.356	59.84
Grove Farm House	12	0.305	60.07
Pen-y-Wern	10	0.254	60.25
The Grove Inn	8	0.203	
Brooklea	6	0.152	60.03
Fernlea	5	0.127	60.21
The Bungalow	4	0.102	60.02
Gray Gables	2	0.051	60.30
Penylan House	1	0.025	60.37
The Olde Shoppe	0.5	0.013	60.55
Icthus	-	-	60.82
Pentre Cottage	-	-	60.61
The Beck	-	-	60.75
Toowoomba	-	-	60.78
Windsor Place	-	-	
Yew Tree Cottage	-	-	60.34

This Jacobs/Mouchel report of June 2009 proposed a barrier that was a forerunner of that proposed for the North West Relief Road in autumn 2020. It was shelved when funding for the NWRR failed to materialise at that time.



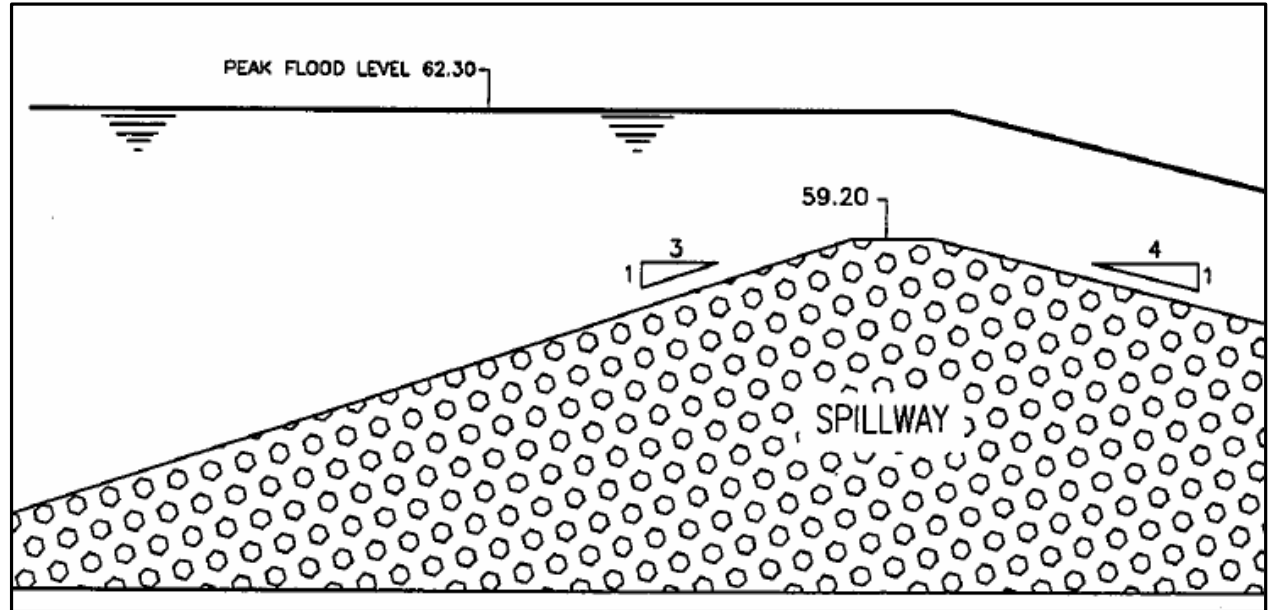
enhancing... improving... cleaning... restoring...
changing... tackling... protecting... reducing...
create a better place... influencing... inspiring...
advising... managing... adapting...

Severn Valley Flood Risk Management Scheme
Phase 2

Pre-feasibility Report – Phase 2
Final

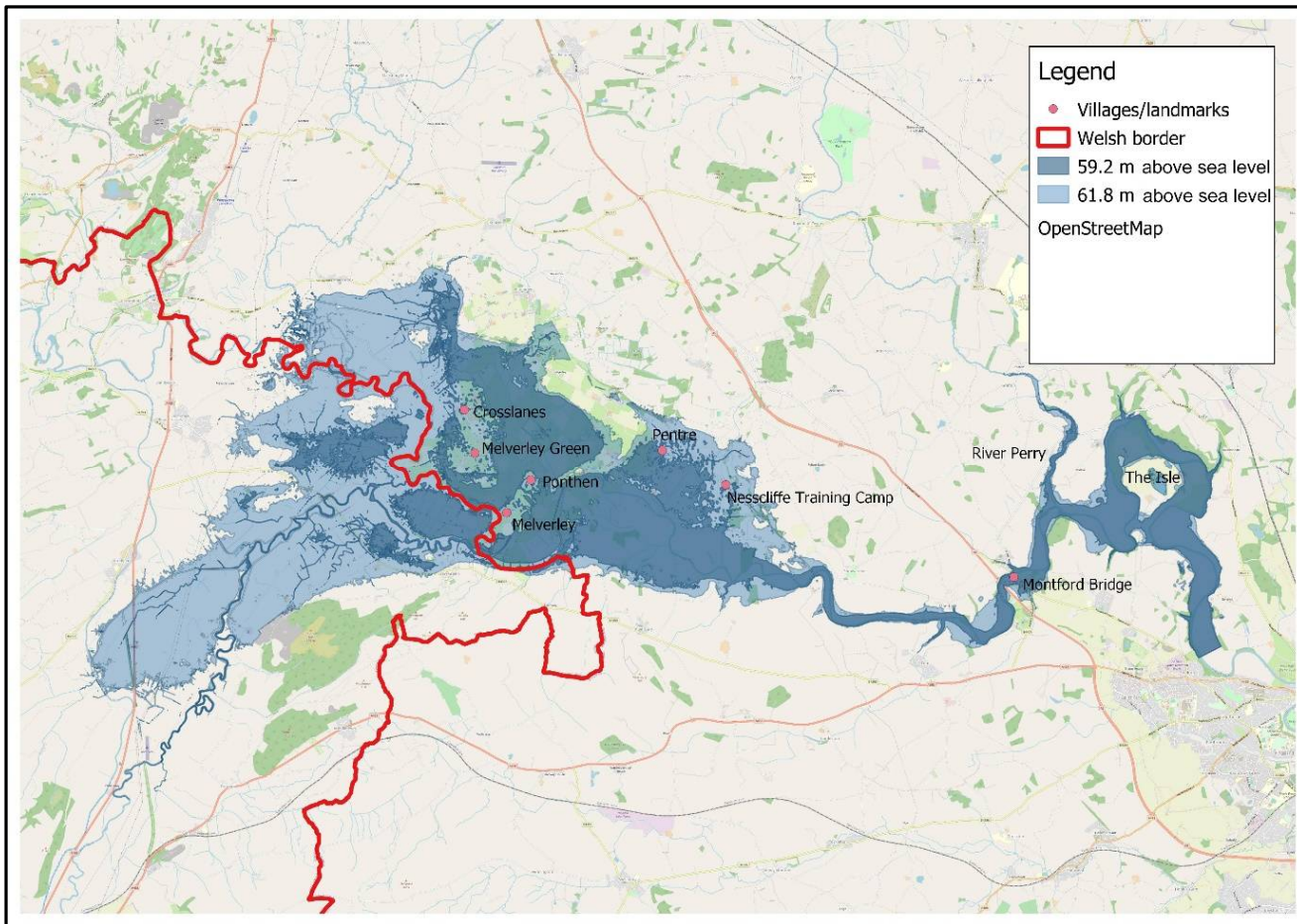
Date: June 2009

ea/br/e/st/v1



62.30m is also the predicted peak level at around Llandrinio Bridge

How many more houses would be submerged than now?



This is Save our Severn's modelling, in response to the NWRR proposals, which was partly based on the above 2009 Jacobs/Mouchel report

This map shows Save Our Severn's modelling of two possible reservoir levels. 59.2m is the proposed spillway height and 61.8m is the level required to hold the 2000 flood, making this the largest freshwater reservoir by area in the UK. This huge area of shallow water would need to be drained empty after every flood event in order to catch the next flood, creating a huge deserted plain of land 1,000s of hectares in size.

Catchment wide/holistic remedies for flooding

Being looked at by:

The Severn Valley Water Management Scheme (SVWMS)

Our aim is to make the Severn Valley more resilient to climate change by adopting a range of measures that will work together to reduce flood risk, manage water resources and enhance the environment

[Severn Valley Water Management Scheme - Environment Agency - Citizen Space \(environment-agency.gov.uk\)](https://www.environment-agency.gov.uk/citizen-space/severn-valley-water-management-scheme)

River Severn Partnership (RSP)

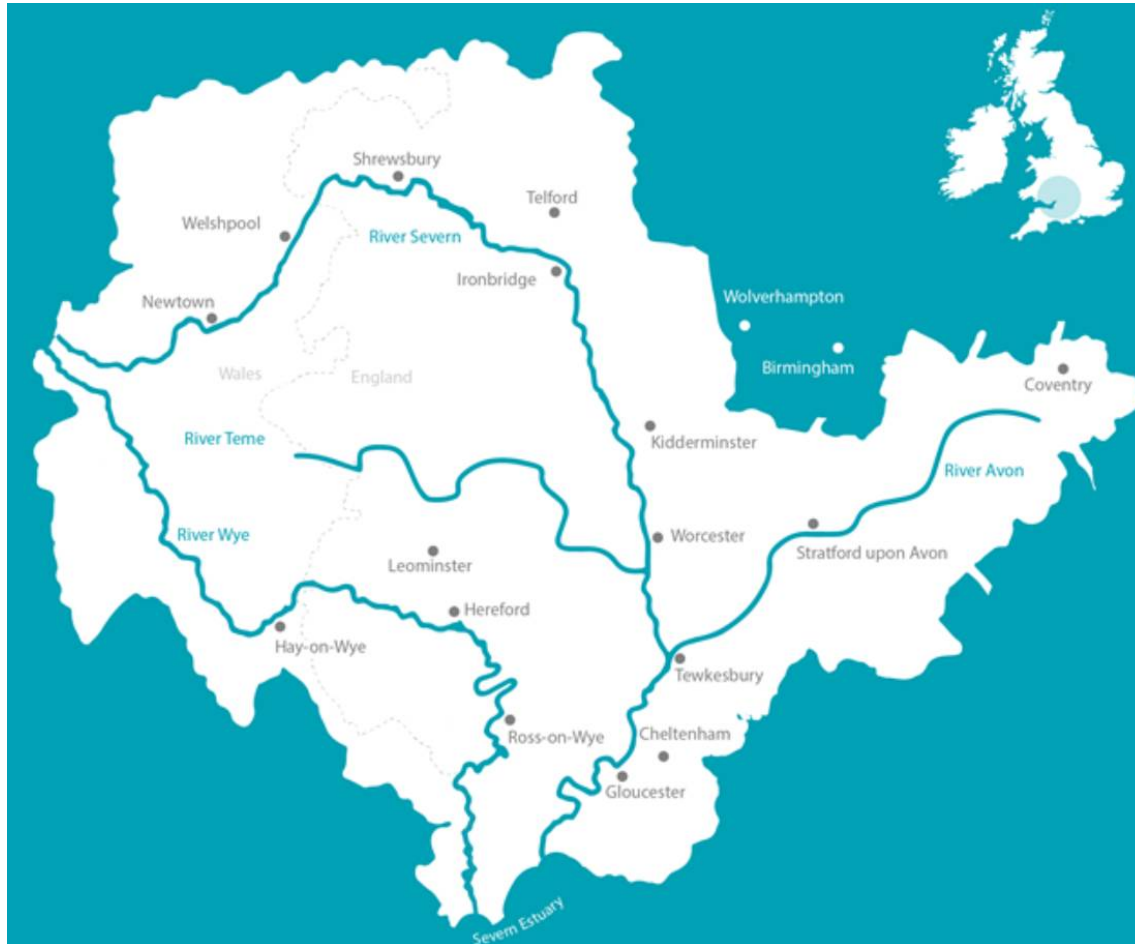
The aim of the Partnership is to make the Severn Catchment Britain's most vibrant and resilient river network; where an exceptional quality of life, prosperous local economies and an outstanding natural environment is driven by a programme of innovation to reduce flood risk, secure future water resources and improve and deliver shared natural assets

[River Severn Partnership](https://www.riversevernpartnership.org/)

- SVWMS project team's modelling taking account of climate change indicates peak flows of something above 700 cumecs, immediately upstream of Shrewsbury at a single point
- They aim, with a catchment-wide approach, to reduce that to 350 cumecs
- It is recognised that Natural Flood Management and similar measures are unlikely to be able to provide the capacity to reduce the design flows from 700 cumecs to 350 cumecs, but that they could be part of a package that would inevitably also include engineered solutions "somewhere in the catchment"

River Severn Partnership area and who's involved

(last updated in November 2020 but liable to change)



Partners

- Environment Agency
- Shropshire Council
- Telford and Wrekin Council
- Herefordshire Council
- Worcestershire County Council
- Wychavon District Council
- Wyre Forest District Council
- Malvern Hills District Council
- Worcester City
- Gloucestershire County Council
- Tewkesbury Borough Council
- Powys County Council
- Marches LEP
- Worcestershire LEP
- Gloucestershire LEP
- Greater Birmingham and Solihull LEP
- Water Resources West
- Severn Trent Water
- Natural Resources Wales
- Severn Rivers Trust
- Local Nature Partnerships
- Wildlife Trusts
- National Farmers Union
- Natural England
- Homes England
- Birmingham City University

Who else are we talking to?

- CLA
- Midlands Connect
- Forestry Commission
- Dŵr Cymru Welsh Water

The area covered is based on catchment boundaries