

Monthly water situation report: North-west England

1 Summary – November 2024

1.1 Rainfall

Rainfall for north-west England for November was classed as below normal with 68% of the long-term average (LTA). The Cumbria and Lancashire (CLA) area observed 64% of the LTA also classed as below normal. The Greater Manchester Merseyside and Cheshire (GMC) area observed more rainfall with 90% of the LTA classed as normal.

During November rainfall for north-west England was classed between below normal and normal. The highest rainfall (in terms of the LTA) was recorded in the Cheshire Rivers Group hydrological area with 105% of the LTA classed as normal. The lowest rainfall was recorded in the Esk (Dumfries) hydrological area with 53% of the LTA classed as below normal. For the remaining hydrological areas 4 were classed as normal and 4 as below normal with all hydrological areas observing below normal rainfall located within CLA.

Cumulative rainfall over the past 3 months was classed between exceptionally high and notably low. The 3 month cumulative rainfall has a similar pattern to the rainfall seen in November with the highest being recorded in the Cheshire rivers group with 157% of the LTA classed as exceptionally high. The lowest was recorded in the Esk (Derwent) with 65% of the LTA classed as notably low.

The 6 month cumulative rainfall totals show rainfall classed between above normal and normal. Matching November and the 3 month cumulative total the heaviest rainfall was recorded in the Cheshire Rivers Group hydrological area with 126% of the LTA classed as above normal. The lowest was recorded in the Ribble hydrological area with 89% of the LTA classed as normal.

The cumulative rainfall totals for the last 12 months were classed between exceptionally high and notably high with the heaviest rainfall recorded in the Cheshire Rivers Group hydrological area with 144% of the LTA and the lowest in the Mersey and Irwell hydrological area with 124% of the LTA. It has been the wettest 12 month period ending in November since 1871 for:

- Esk (Cumbria) with 2312mm, breaking the previous record of 2281mm in 2020
- Kent with 2333mm, breaking the previous record of 2241mm in 1928

1.2 Soil moisture deficit and recharge

Despite the lower than average November rainfall across north-west England, heavy rainfall toward the end of the month resulted in SMD levels between 0 and 1mm. SMD levels decreased across all areas that were not already fully saturated and were all lower than expected for the time of year.

1.3 River flows

Please note that monthly mean flows recorded for the River Bollin at Bollington Mill gauging station have not been included in this report due to data quality concerns.

Monthly mean river flows for north-west England were classed between notably high and exceptionally low. Of the 16 sites in the CLA area 4 were classed as normal, 8 as below normal 2 as notably low and 2 as exceptionally low. The lowest monthly mean flow for north-west England was recorded in the River Ellen at Bullgill with 38% of the LTA flow for November classed as exceptionally low.

Out of the 9 sites in the GMC area 1 was classed as notably high, 1 as above normal, 1 as below normal and the rest as normal. The highest mean flow for north-west England was recorded in the River Weaver at Ashbrook with 199% of the LTA classed as notably high.

1.4 Groundwater levels

Groundwater levels for north-west England for the end of November were classed between exceptionally high and normal. Two sites changed classification with Bruntwood Hall increasing from above normal to notably high and Furness Abbey decreasing from exceptionally high to notably high. All other sites remained at the same classification as follows:

- Brown Bank Lay By as notably high
- Great Musgrave as normal
- Lea Lane as normal
- Primrose Hill as normal
- Priors Heyes as exceptionally high
- Skirwith as notably high
- Richmond Park as exceptionally high
- Victoria Road as normal

Levels at Priors Heyes remain high compared to historic levels because the aquifer is recovering from the effects of historically high abstractions.

1.5 Reservoir stocks

Total reservoir storage for north-west England at the end of November was at 76% after decreasing during the month then recovering to the same storage as at the end of October. This is lower than the average of 82% at this time of year and lower than this time last year when the total reservoir storage was 85%.

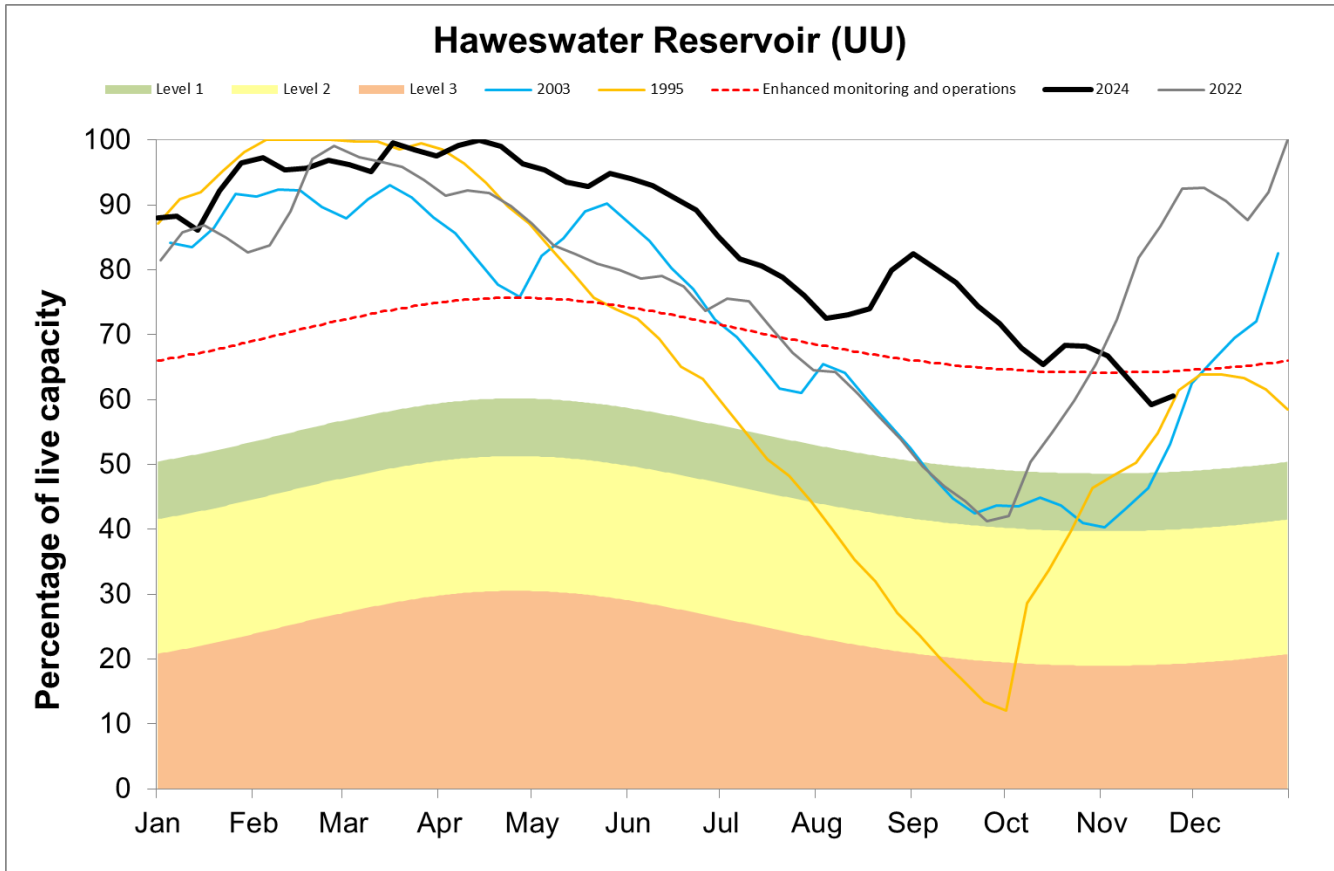
At the end of November, reservoir storage (in terms of percentage) was highest at Crummock Water which was 100% full and lowest at Haweswater which was 61% full. The combined storage at Haweswater and Thirlmere was 64% which is lower than the average of 79% at this time of year and lower than last year when it was 83%.

Reservoirs kept low for maintenance work include:

- Audenshaw No.1
- Torside
- Anglezarke
- High Bullough

Figure 1.5: Storage in Haweswater Reservoir, including the drought levels for the reservoir and storage for the current year (2024) and representative years: 1995, 2003 and 2022 (Source: *United Utilities* (UU)).

2024 2022 2003 1995



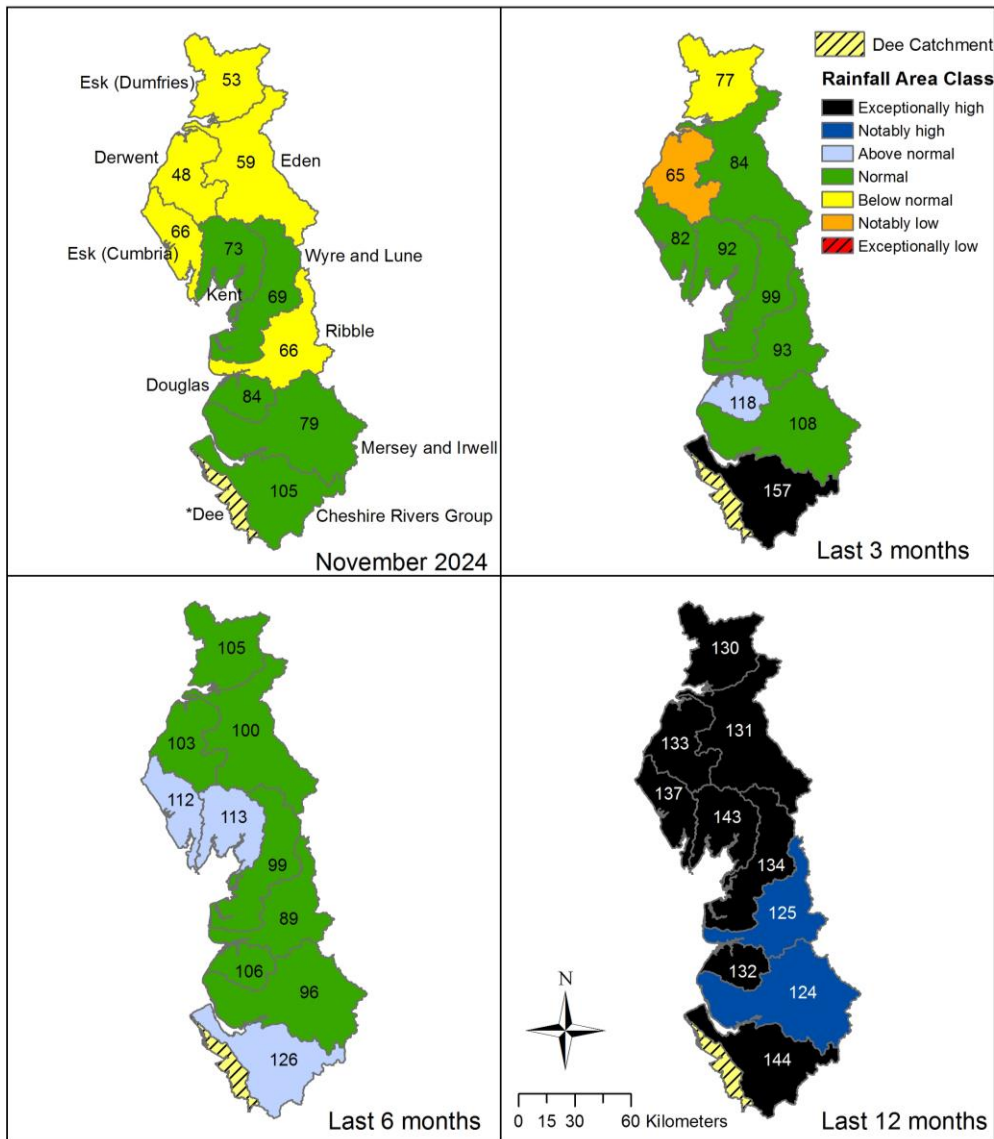
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Author: Greater Manchester Merseyside and Cheshire Hydrology Team,
hydrology.gmmych@environment-agency.gov.uk

2 Rainfall

2.1 Rainfall map

Figure 2.1: Total rainfall (as a percentage) for hydrological areas for the current month (up to 30 November 2024), the last 3 months, the last 6 months, and the last 12 months, classed relative to an analysis of respective historic totals. Table available in the appendices with detailed information.



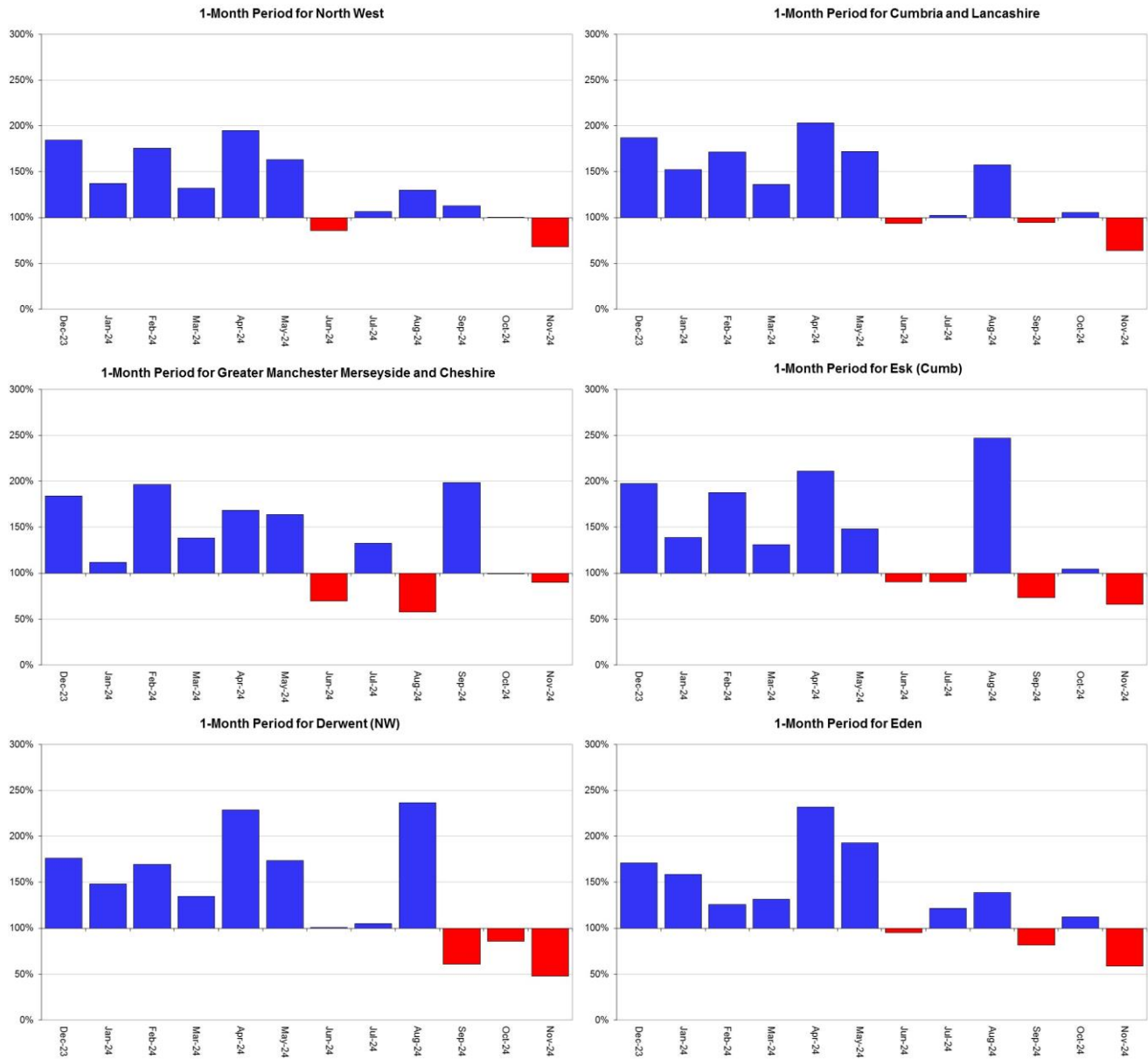
Rainfall data since 2023, extracted from Environment Agency 1km gridded rainfall dataset derived from Environment Agency intensity rain gauges. (Source: Environment Agency. Crown Copyright, 100024198, 2024). Rainfall data prior to 2023, extracted from Met Office HadUK 1km gridded rainfall dataset derived from registered rain gauges (Source: Met Office. Crown copyright, 2024).

2.2 Rainfall charts

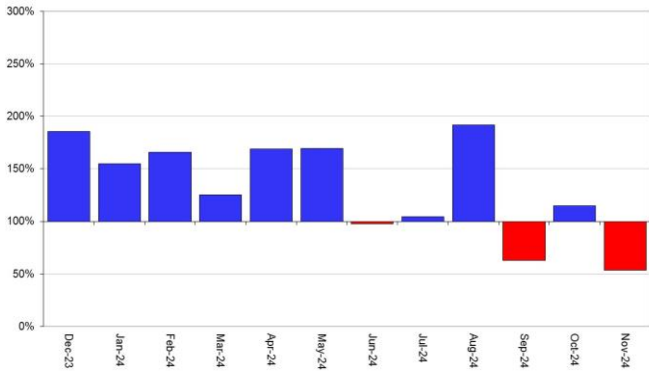
Figure 2.2: Monthly rainfall totals for the past 12 months expressed as a percentage of the 1961 to 1990 long term average for North-west England and its hydrological areas.

Above average rainfall

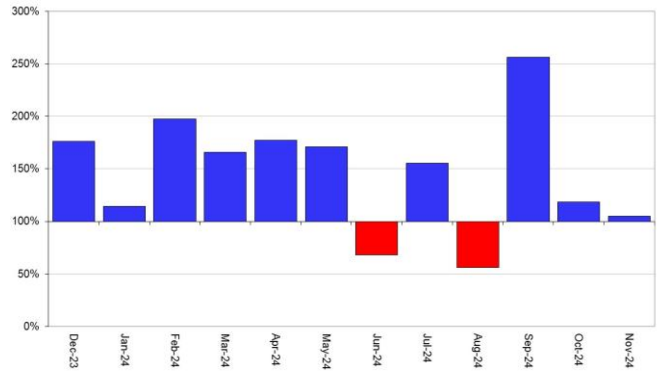
Below average rainfall



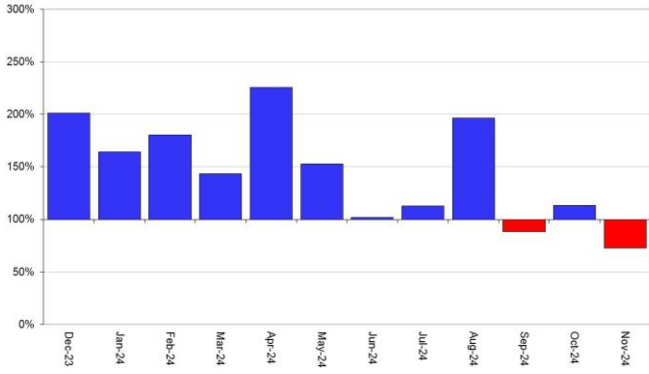
1-Month Period for Esk (Dumfries)



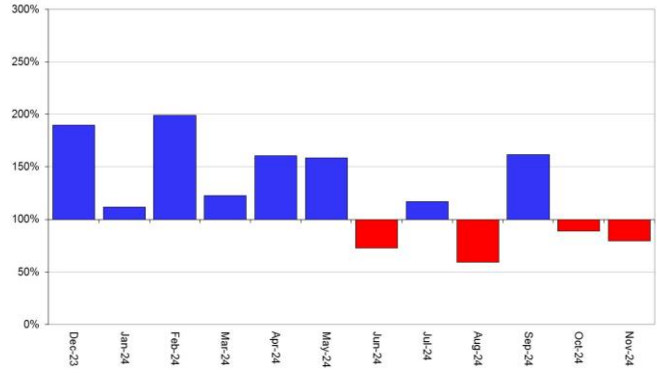
1-Month Period for Cheshire Rivers Group

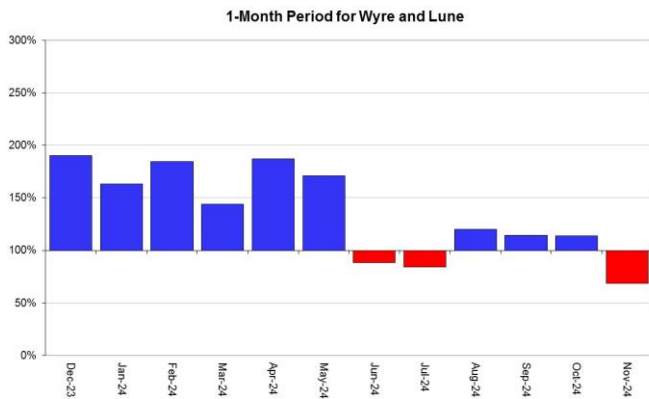
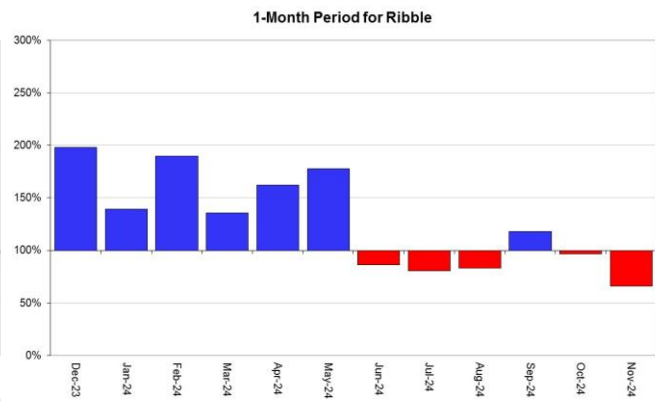
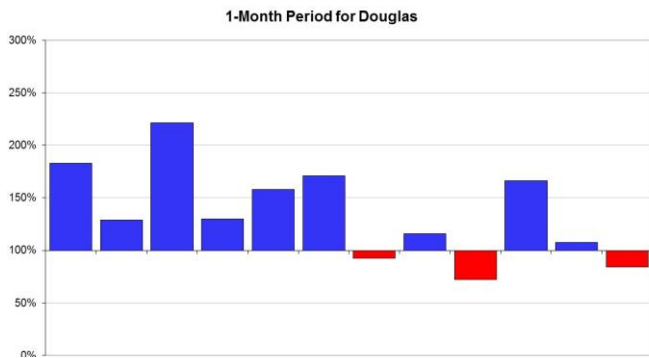


1-Month Period for Kent



1-Month Period for Mersey and Irwell



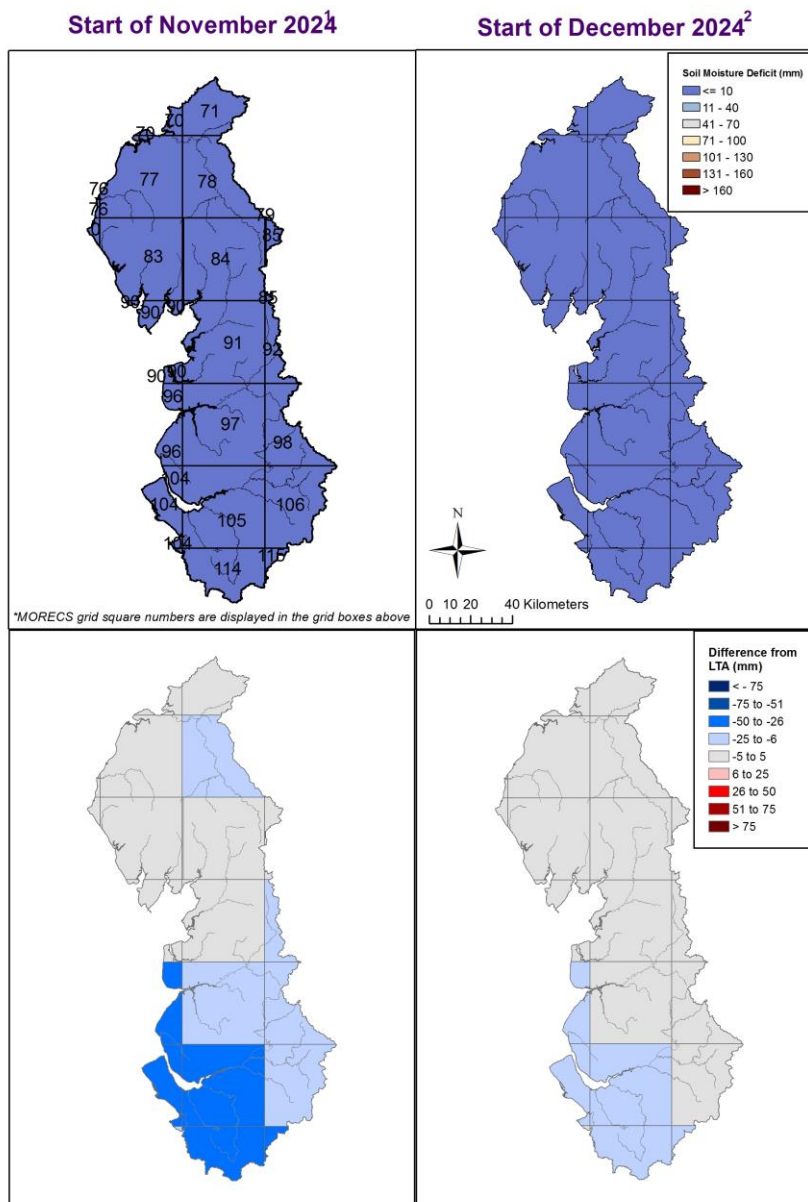


Rainfall data since 2023, extracted from Environment Agency 1km gridded rainfall dataset derived from Environment Agency intensity rain gauges. (Source: Environment Agency. Crown Copyright, 100024198, 2024). Rainfall data prior to 2023, extracted from Met Office HadUK 1km gridded rainfall dataset derived from registered rain gauges (Source: Met Office. Crown copyright, 2024).

3 Soil moisture deficit

3.1 Soil moisture deficit map

Figure 3.1: Soil moisture deficits for weeks ending 1 November 2024 (left panel) and 4 December 2024² (right panel). Top row shows actual soil moisture deficits (mm) and bottom row shows the difference (mm) of the actual from the 1961-90 long term average soil moisture deficits. MORECS data for real land use.

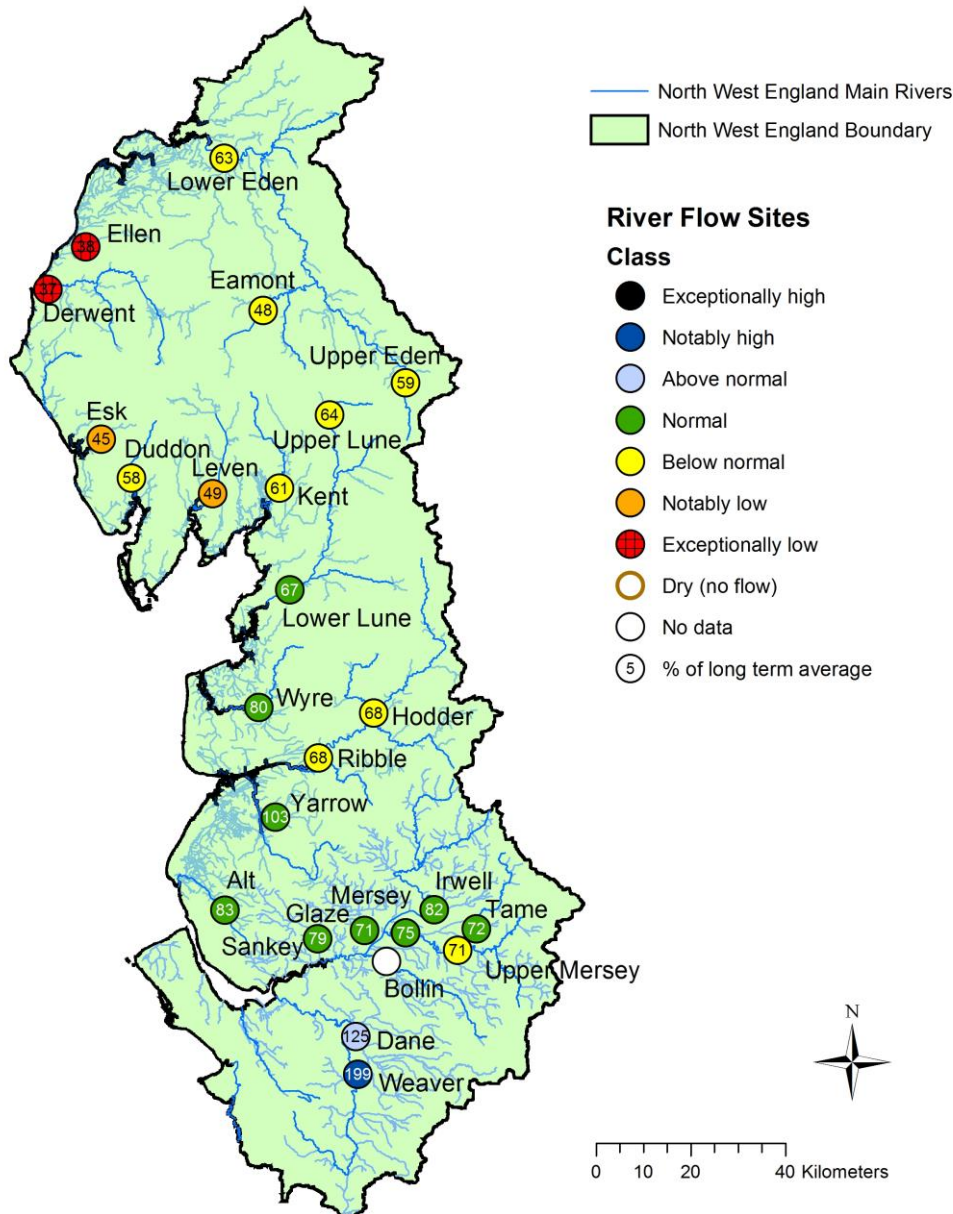


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4 River flows

4.1 River flows map

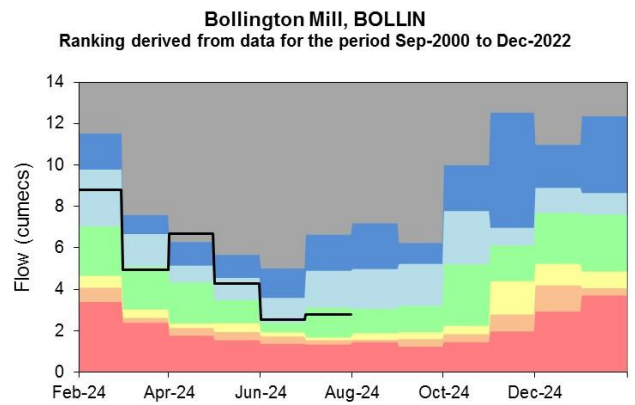
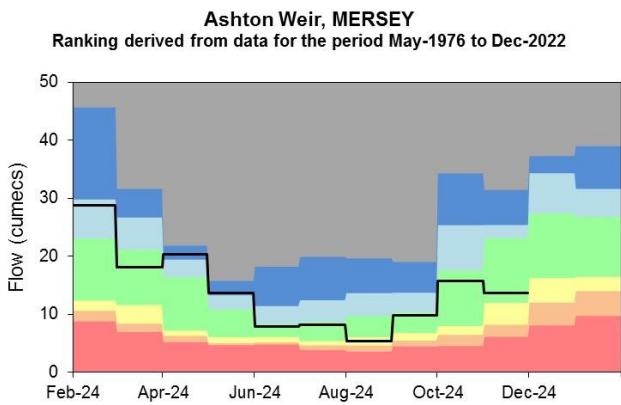
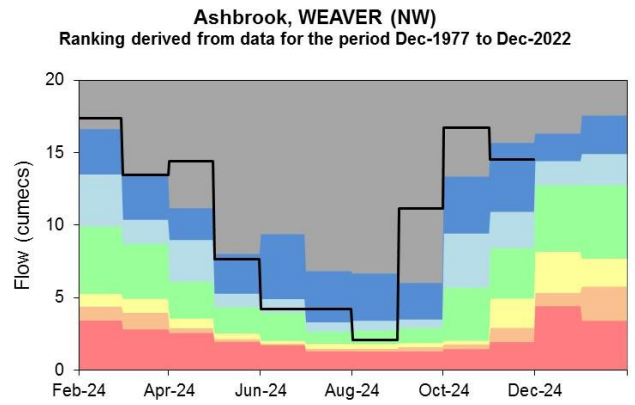
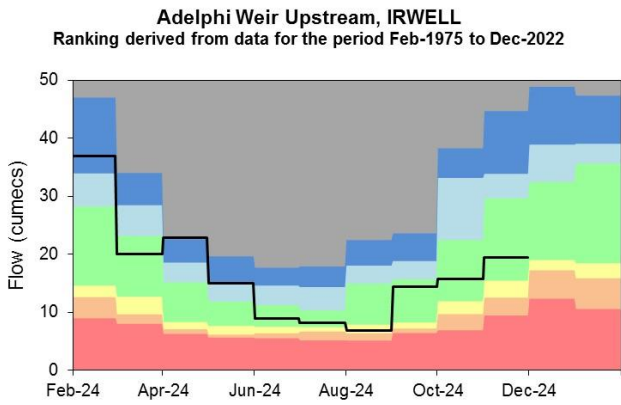
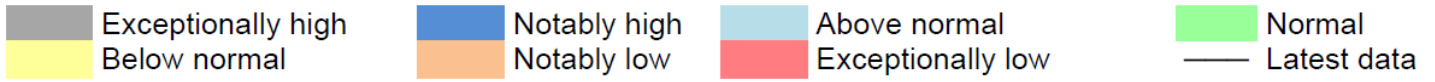
Figure 4.1: Monthly mean river flow for indicator sites for November 2024, expressed as a percentage of the respective long term average and classed relative to an analysis of historic November monthly means. Table available in the appendices with detailed information.



(Source: Environment Agency). Crown copyright. All rights reserved. Environment Agency, 100024198, 2024.

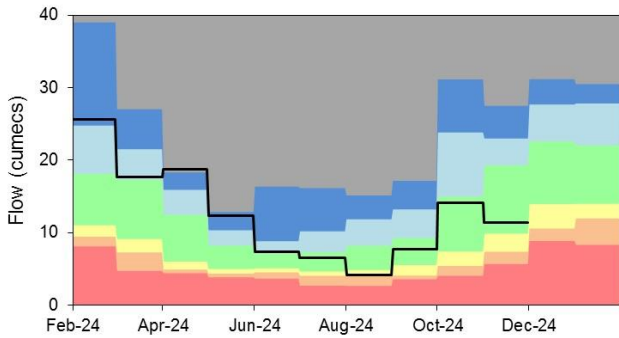
4.2 River flow charts

Figure 4.2: Monthly mean river flow for index sites over the past year, compared to an analysis of historic monthly mean flows.



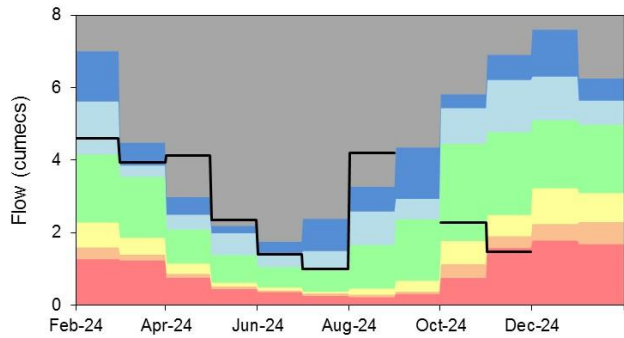
Brinksway, MERSEY

Ranking derived from data for the period Jan-1974 to Dec-2022



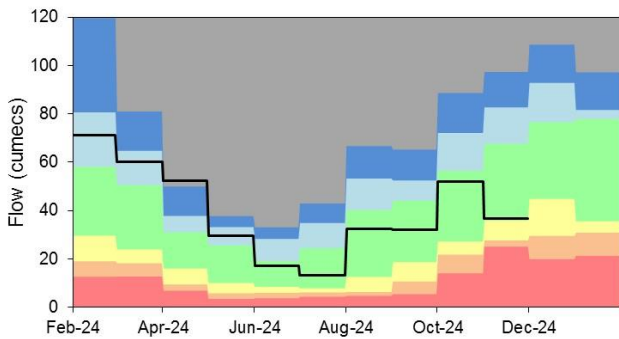
Bullgill, ELLEN

Ranking derived from data for the period Jan-1976 to Dec-2022



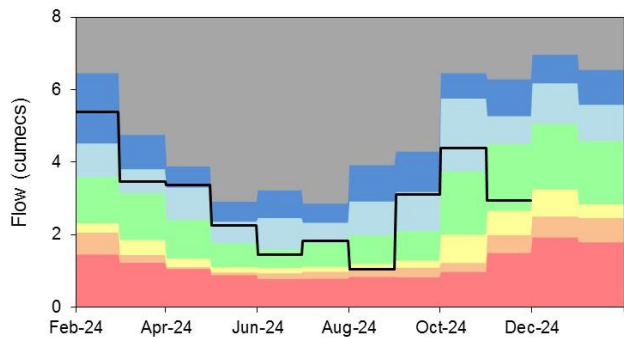
Caton, LUNE

Ranking derived from data for the period Jan-1959 to Dec-2022



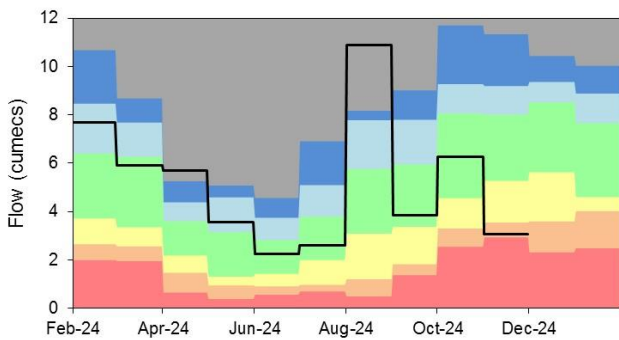
Causey Bridges, SANKEY

Ranking derived from data for the period Jan-1977 to Dec-2022



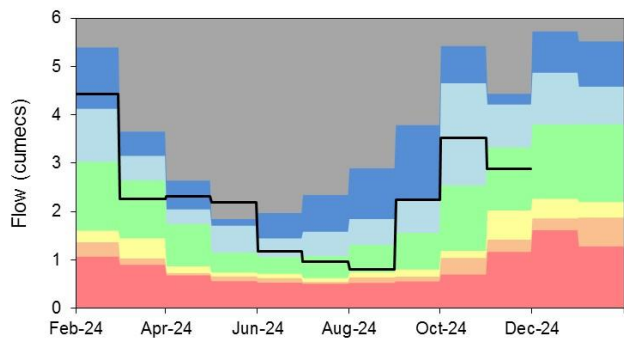
Crople How, ESK (NW)

Ranking derived from data for the period Jan-1976 to Dec-2022

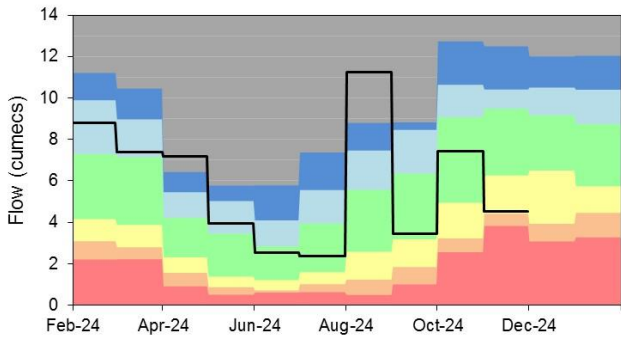


Croston, YARROW

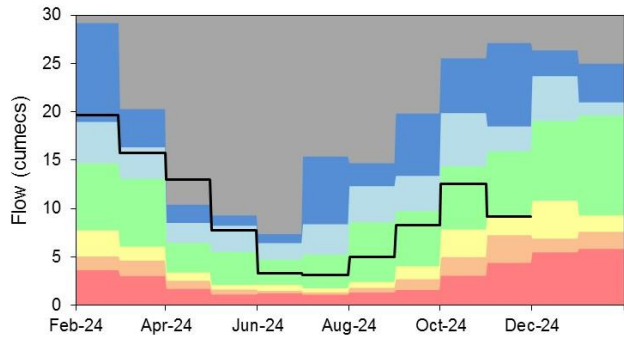
Ranking derived from data for the period Jan-1976 to Dec-2022



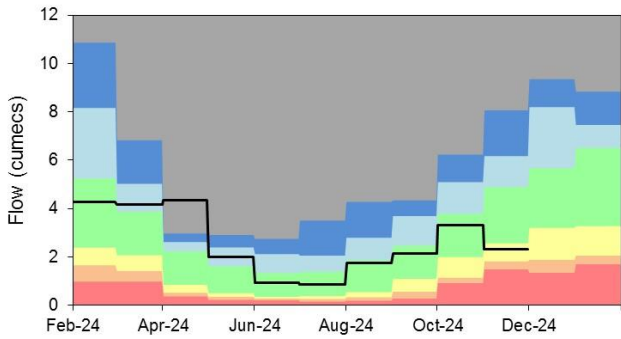
Duddon Hall, DUDDON
Ranking derived from data for the period Mar-1968 to Dec-2022



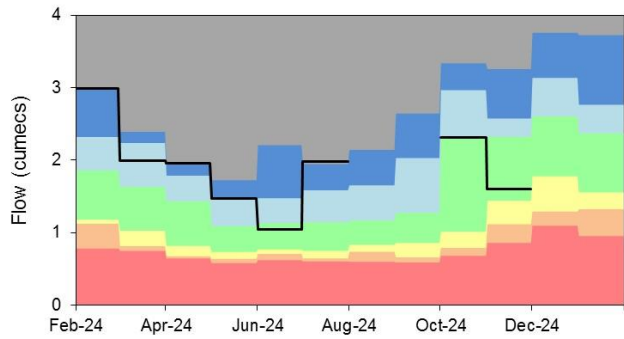
Hodder Place, HODDER
Ranking derived from data for the period Jan-1976 to Dec-2022



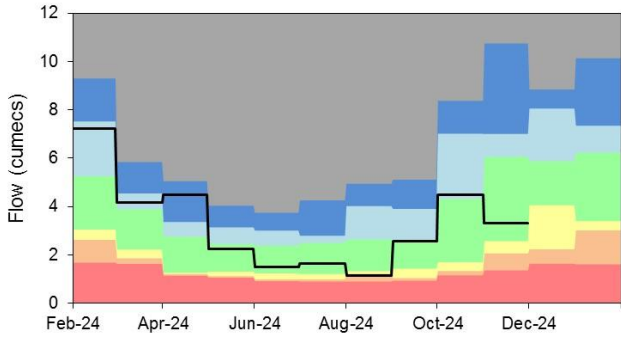
Kirkby Stephen, EDEN (NW)
Ranking derived from data for the period Oct-1971 to Dec-2022



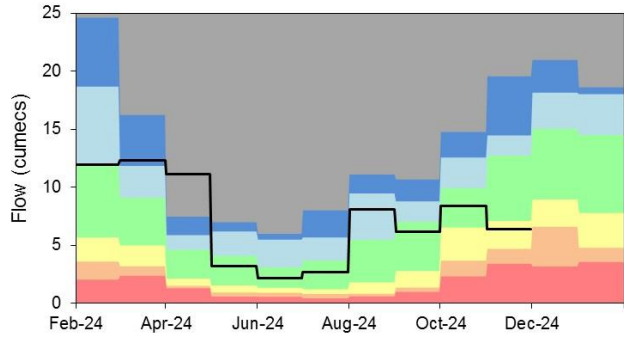
Kirkby, ALT
Ranking derived from data for the period Oct-1977 to Dec-2022



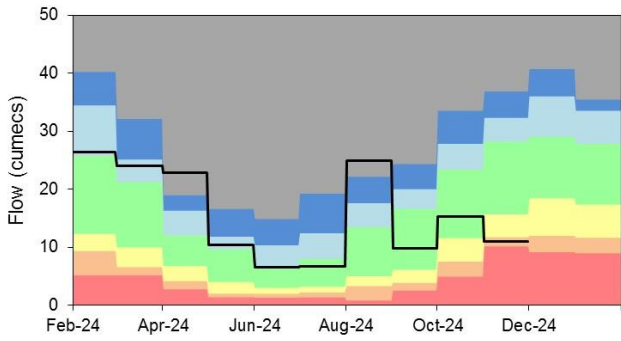
Little Woolden Hall Ultrasonic, GLAZE
Ranking derived from data for the period Jul-1995 to Dec-2022



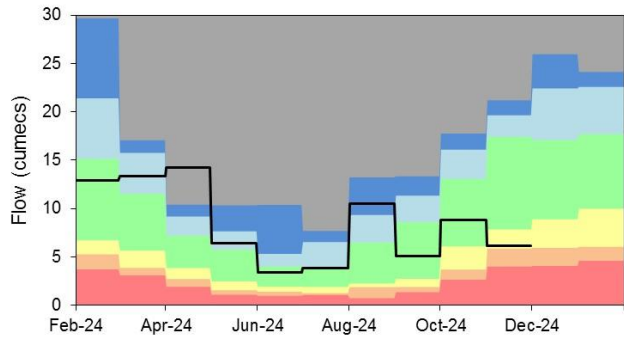
Lunes Bridge, LUNE
Ranking derived from data for the period Dec-1979 to Dec-2022



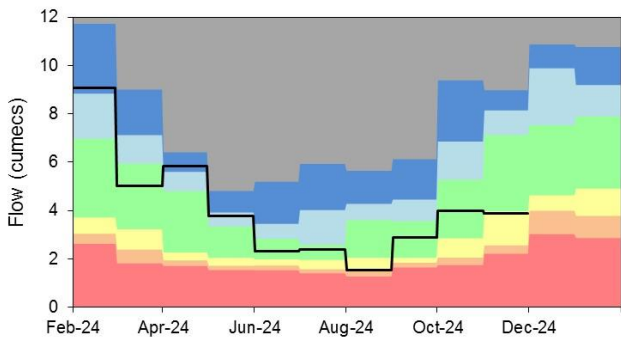
Newby Bridge FMS, LEVEN (NW)
Ranking derived from data for the period Jan-1972 to Dec-2022



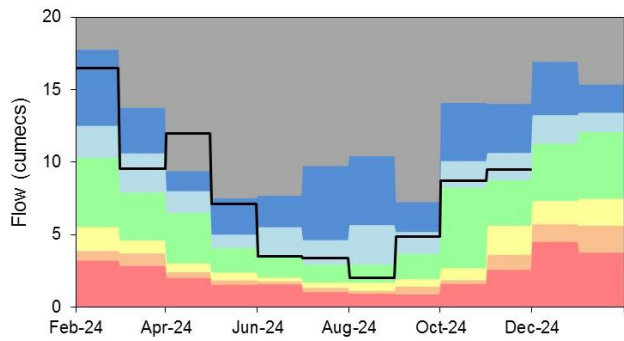
Pooley Bridge, EAMONT
Ranking derived from data for the period Jul-1970 to Dec-2022



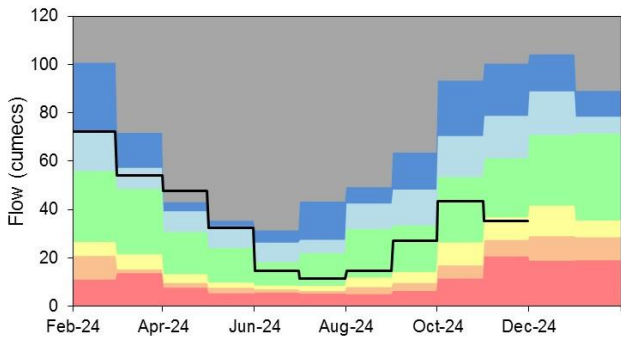
Portwood, TAME
Ranking derived from data for the period Jan-1976 to Dec-2022



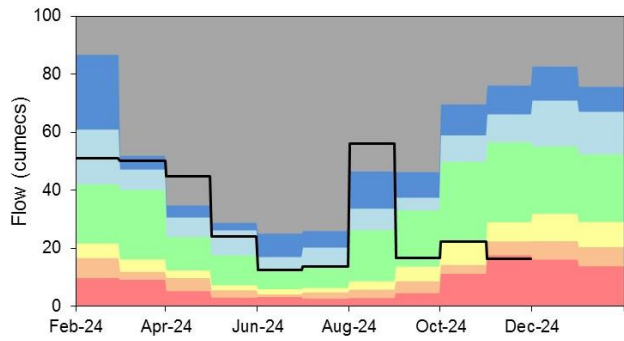
Rudheath, DANE
Ranking derived from data for the period Jan-1976 to Dec-2022



Samlesbury Pgs, RIBBLE (NW)
Ranking derived from data for the period May-1960 to Dec-2022

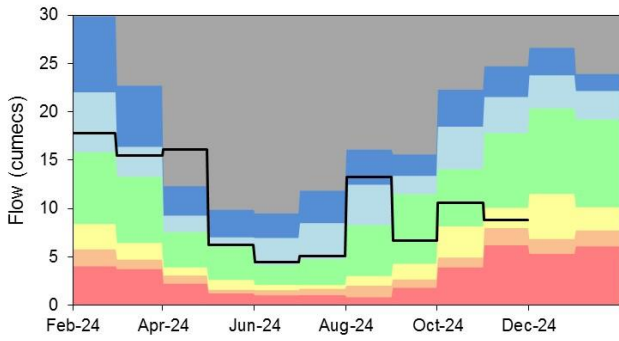


Seaton Mill, DERWENT (NW)
Ranking derived from data for the period Sep-1960 to Dec-2022



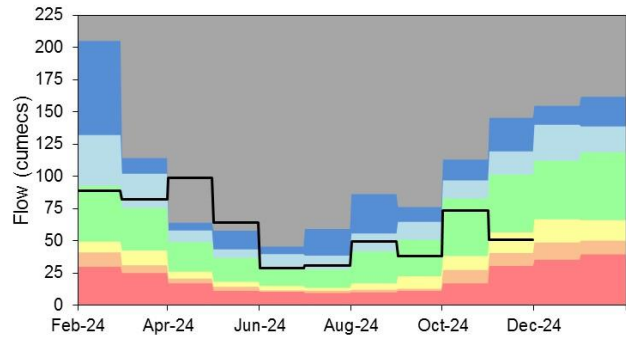
Sedgwick, KENT

Ranking derived from data for the period Nov-1968 to Dec-2022



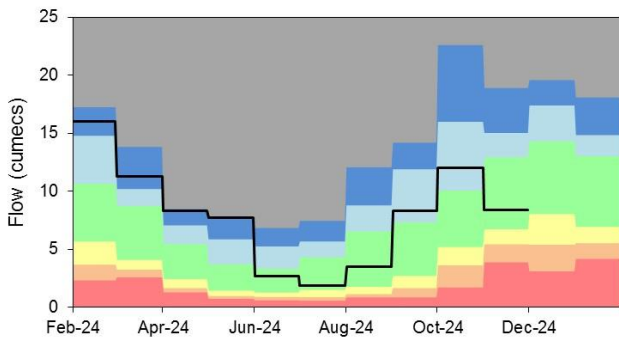
Sheepmount, EDEN (NW)

Ranking derived from data for the period Oct-1967 to Dec-2022



St Michaels FMS, WYRE

Ranking derived from data for the period Oct-1963 to Dec-2022

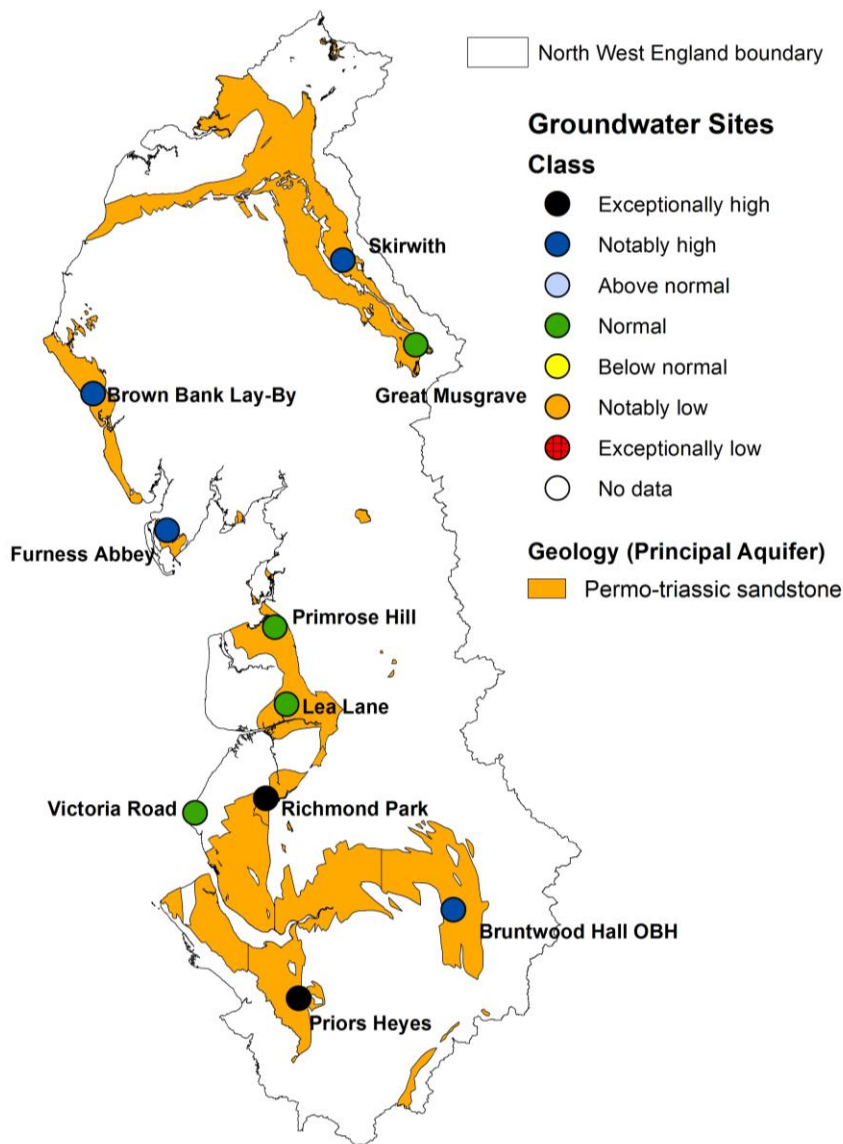


Source: Environment Agency.

5 Groundwater levels

5.1 Groundwater levels map

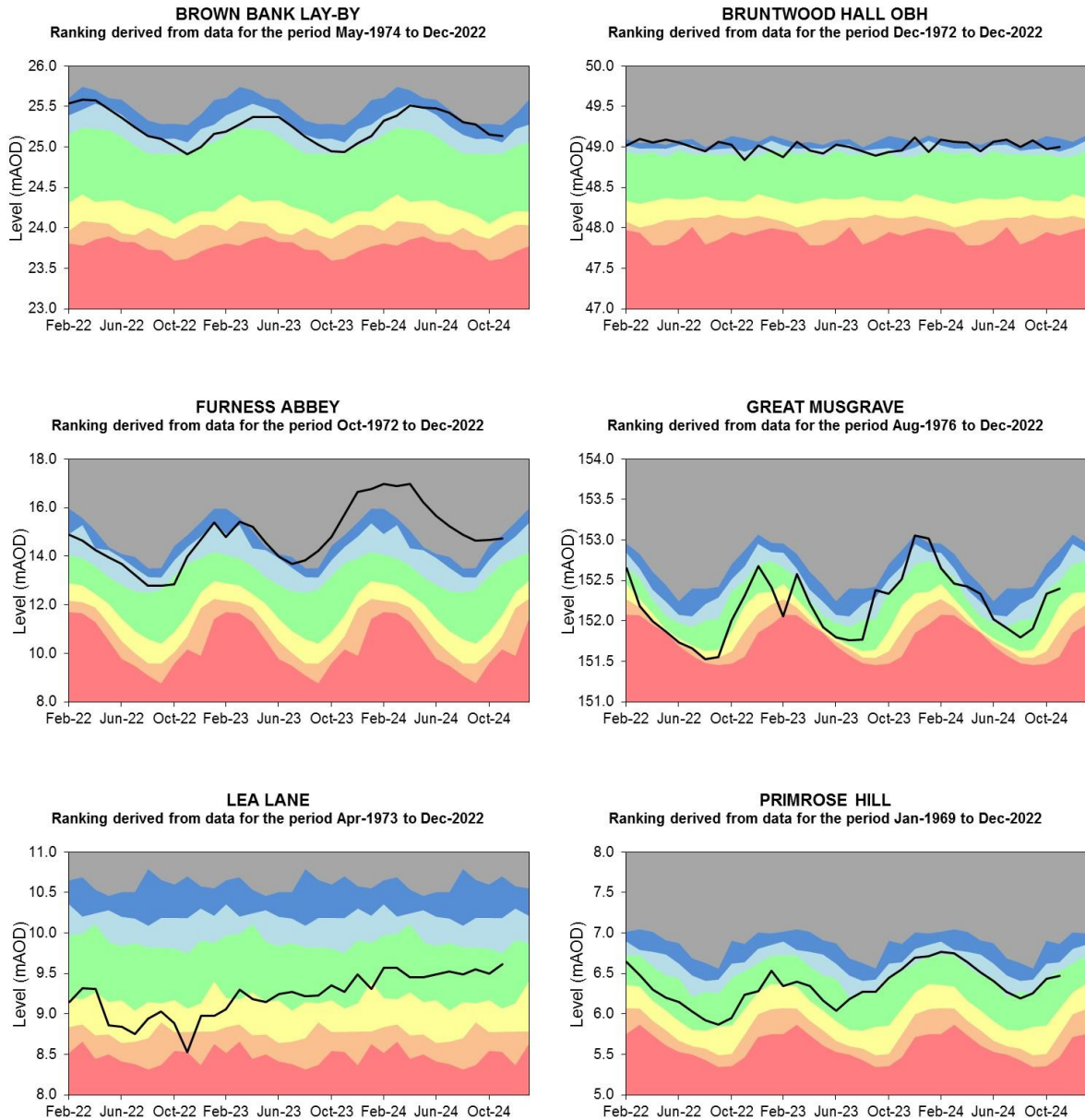
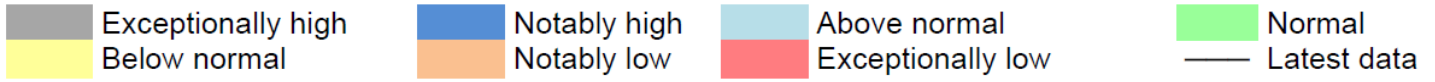
Figure 5.1: Groundwater levels for indicator sites at the end of November 2024, classed relative to an analysis of respective historic November levels. Table available in the appendices with detailed information. Please note Victoria Road Borehole sits within a superficial deposit as opposed to a bedrock aquifer. This is why the geology type is not marked on the map.



(Source: Environment Agency). Geological map reproduced with kind permission from UK Groundwater Forum, BGS copyright NERC. Crown copyright. All rights reserved. Environment Agency, 100024198, 2024.

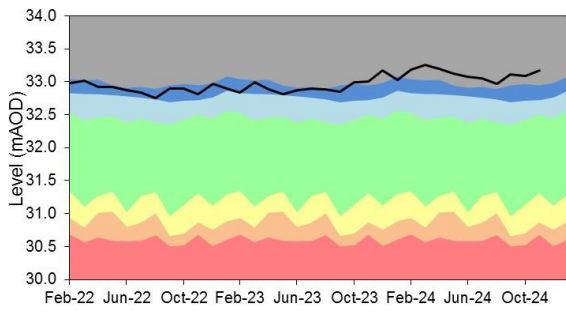
5.2 Groundwater level charts

Figure 5.2: End of month groundwater levels at index groundwater level sites for major aquifers. 34 months compared to an analysis of historic end of month levels and long term maximum and minimum levels.



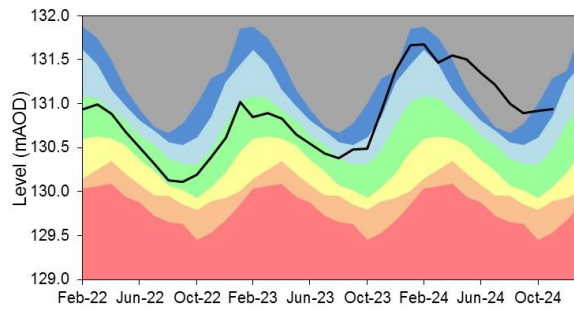
PRIORS HEYES

Ranking derived from data for the period Sep-1972 to Dec-2022



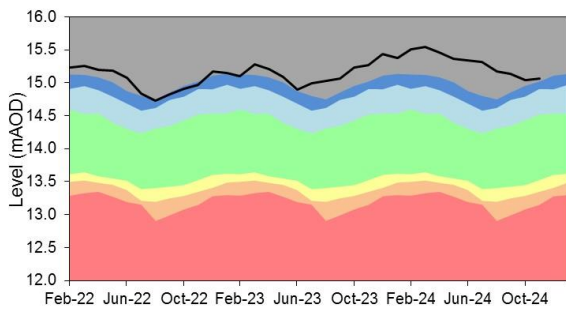
SKIRWITH

Ranking derived from data for the period Oct-1978 to Dec-2022



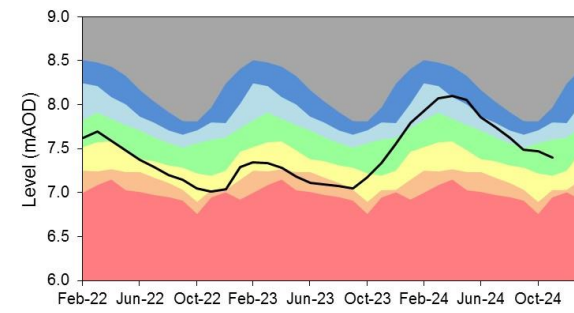
RICHMOND PARK

Ranking derived from data for the period Jun-1971 to Dec-2022



VICTORIA ROAD

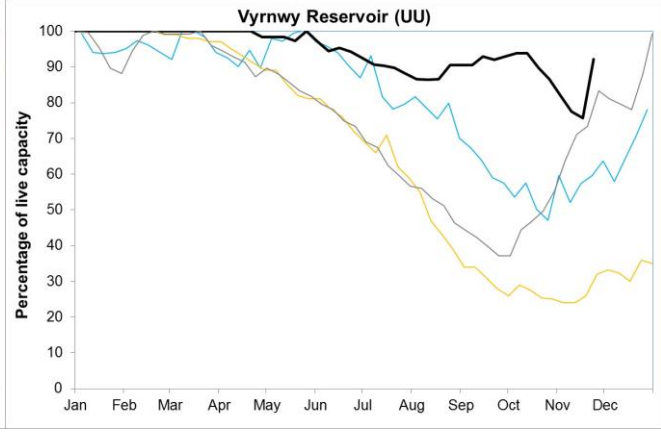
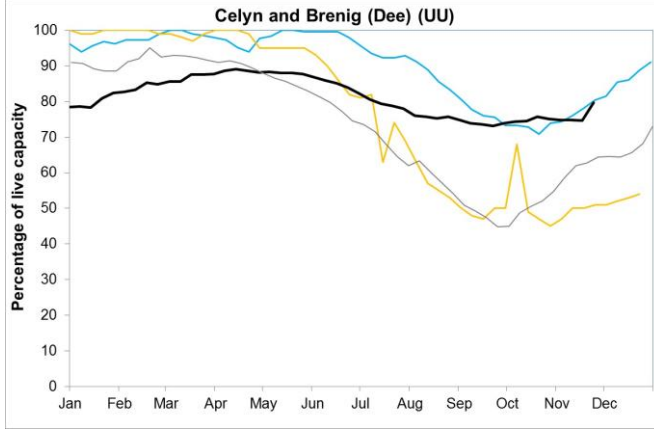
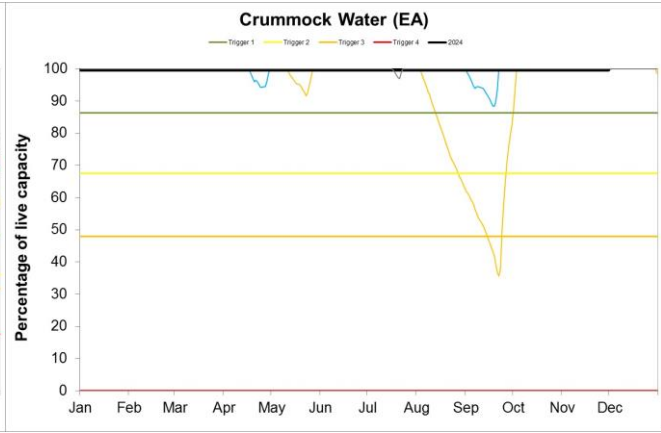
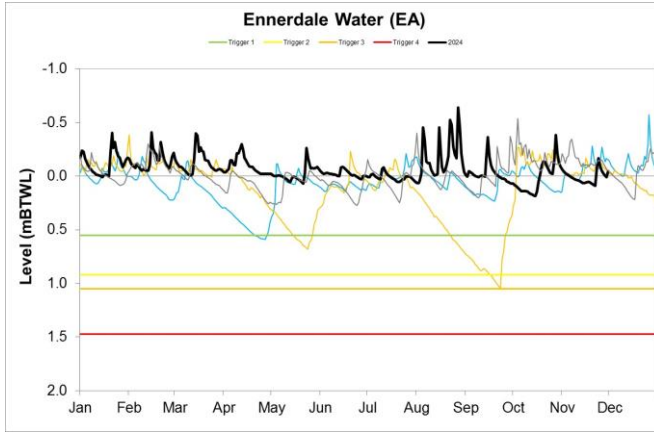
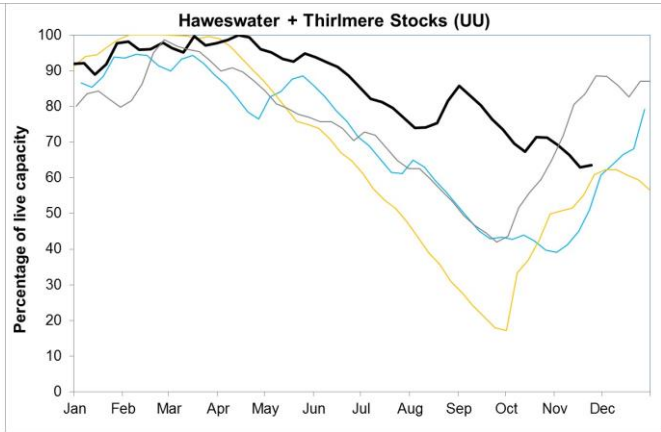
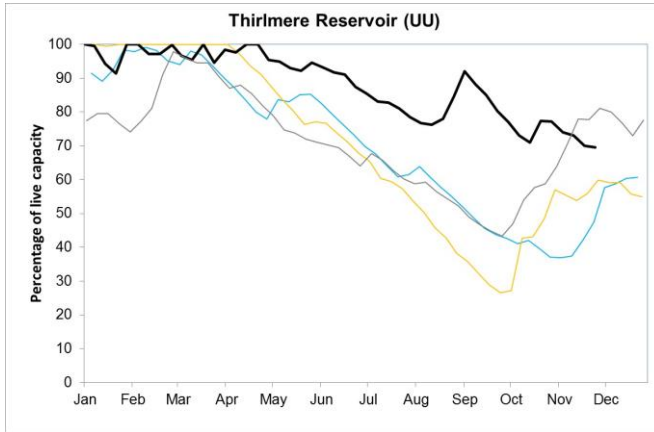
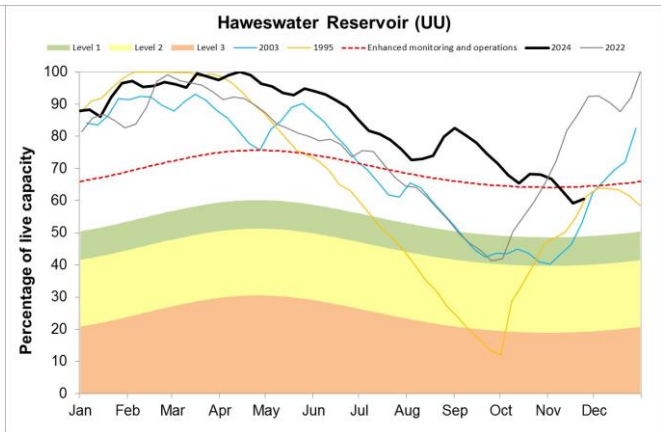
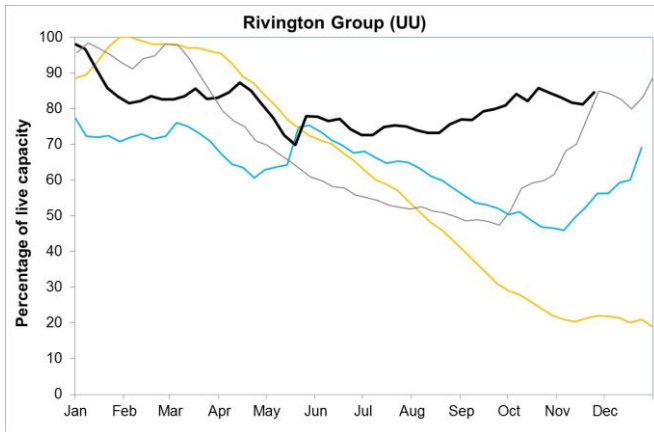
Ranking derived from data for the period Jun-1999 to Dec-2022



Source: Environment Agency, 2024.

Figure 6.2: End of month reservoir storage for supply districts across North-west England and selected individual reservoirs for current year (2024) and representative years: 1995, 2003 and 2022. Note: Historic records of individual reservoirs and reservoir groups making up the regional values vary in length.





Source: (UU) United Utilities, (EA) The Environment Agency.

7 Glossary

7.1 Terminology

Aquifer

A geological formation able to store and transmit water.

Areal average rainfall

The estimated average depth of rainfall over a defined area. Expressed in depth of water (mm).

Artesian

The condition where the groundwater level is above ground surface but is prevented from rising to this level by an overlying continuous low permeability layer, such as clay.

Artesian borehole

Borehole where the level of groundwater is above the top of the borehole and groundwater flows out of the borehole when unsealed.

Cumecs

Cubic metres per second (m^3s^{-1}).

Effective rainfall

The rainfall available to percolate into the soil or produce river flow. Expressed in depth of water (mm).

Flood alert and flood warning

Three levels of warnings may be issued by the Environment Agency. Flood alerts indicate flooding is possible. Flood warnings indicate flooding is expected. Severe flood warnings indicate severe flooding.

Groundwater

The water found in an aquifer.

Long term average (LTA)

The arithmetic mean calculated from the historic record, usually based on the period 1961 to 1990. However, the period used may vary by parameter being reported on (see figure captions for details).

mAOD

Metres above ordnance datum (mean sea level at Newlyn Cornwall).

MORECS

Met Office Rainfall and Evaporation Calculation System. Met Office service providing real time calculation of evapotranspiration, soil moisture deficit and effective rainfall on a 40 by 40 km grid.

Naturalised flow

River flow with the impacts of artificial influences removed. Artificial influences may include abstractions, discharges, transfers, augmentation and impoundments.

NCIC

National Climate Information Centre. NCIC area monthly rainfall totals are derived using the Met Office 5 km gridded dataset, which uses rain gauge observations.

Recharge

The process of increasing the water stored in the saturated zone of an aquifer. Expressed in depth of water (mm).

Reservoir gross capacity

The total capacity of a reservoir.

Reservoir live capacity

The capacity of the reservoir that is normally usable for storage to meet established reservoir operating requirements. This excludes any capacity not available for use (for example, storage held back for emergency services, operating agreements or physical restrictions). May also be referred to as 'net' or 'deployable' capacity.

Soil moisture deficit (SMD)

The difference between the amount of water actually in the soil and the amount of water the soil can hold. Expressed in depth of water (mm).

7.2 Categories

Exceptionally high

Value likely to fall within this band 5% of the time.

Notably high

Value likely to fall within this band 8% of the time.

Above normal

Value likely to fall within this band 15% of the time.

Normal

Value likely to fall within this band 44% of the time.

Below normal

Value likely to fall within this band 15% of the time.

Notably low

Value likely to fall within this band 8% of the time.

Exceptionally low

Value likely to fall within this band 5% of the time.

8 Appendices

8.1 Rainfall table

Hydrological area	Nov 2024 rainfall % of long term average 1961 to 1990	Nov 2024 band	Sep 2024 to November cumulative band	Jun 2024 to November cumulative band	Dec 2023 to November cumulative band
Cheshire Rivers Group	105	Normal	Exceptionally high	Above normal	Exceptionally high
Derwent (NW)	48	Below Normal	Notably low	Normal	Exceptionally high
Douglas	84	Normal	Above normal	Normal	Exceptionally high
Eden	59	Below Normal	Normal	Normal	Exceptionally high
Esk (Cumbria)	66	Below Normal	Normal	Above normal	Exceptionally high
Esk (Dumfries)	53	Below Normal	Below normal	Normal	Exceptionally high
Kent	73	Normal	Normal	Above normal	Exceptionally high
Mersey And Irwell	79	Normal	Normal	Normal	Notably high
Ribble	66	Below Normal	Normal	Normal	Notably high

Wyre And Lune	69	Normal	Normal	Normal	Exceptionally high
North-west	68	Below Normal	Normal	Normal	Exceptionally high

8.2 River flows table

Site name	River	Catchment	Nov 2024 band	Oct 2024 band
Adelphi Weir Upstream	Irwell	Irwell (Croal to Irk)	Normal	Normal
Ashbrook	Weaver (NW)	Weaver Upper	Notably high	Exceptionally high
Ashton Weir	Mersey	Mersey Non Tidal	Normal	Normal
Bollington Mill	Bollin	Bollin		
Brinksway	Mersey	Mersey Non Tidal	Normal	Normal
Bullgill	Ellen	Ellen Lower	Exceptionally low	Normal
Caton	Lune	Lune Lower Tidal	Normal	Normal
Causey Bridges	Sankey	Mersey Non Tidal	Normal	Above normal
Crople How	Esk (NW)	Esk (South West Lakes)	Notably low	Normal
Croston	Yarrow	Yarrow Lower	Normal	Above normal
Duddon Hall	Duddon	Duddon	Below normal	Normal
Hodder Place	Hodder	Hodder Lower	Below normal	Normal
Kirkby	Alt	Alt	Normal	Normal

Kirkby Stephen	Eden (NW)	Eden Cumbria Upper	Below normal	Normal
Little Woolden Hall Ultrasonic	Glaze	Glaze	Normal	Above normal
Lunes Bridge	Lune	Lune Upper	Below normal	Normal
Newby Bridge Fms	Leven (NW)	Leven Cumbria	Notably low	Normal
Pooley Bridge	Eamont	Eamont	Below normal	Normal
Portwood	Tame	Tame	Below normal	Normal
Rudheath	Dane	Dane	Above normal	Above normal
Samlesbury Pgs	Ribble (NW)	Ribble Lower	Below normal	Normal
Seaton Mill	Derwent (NW)	Derwent Cumbria Lower	Exceptionally low	Below normal
Sedgwick	Kent	Levens Bridge	Below normal	Normal
Sheepmount	Eden (NW)	Eden Cumbria Lower	Below normal	Normal
St Michaels Fms	Wyre	Brock	Normal	Above normal

8.3 Groundwater table

Site name	Aquifer	End of Nov 2024 band	End of Oct 2024 band
Brown Bank Lay-by	West Cumbria Permo-triassic Sandstone	Notably high	Notably high
Bruntwood Hall Obh	East Cheshire Permo-triassic Sandstone	Notably high	Above normal
Furness Abbey	Furness Permo-triassic Sandstone	Notably high	Exceptionally high
Great Musgrave	Eden Valley And Carlisle Basin Permo-triassic Sandstone	Normal	Normal
Lea Lane	Fylde Permo-triassic Sandstone	Normal	Normal
Priors Heyes	West Cheshire Permo-triassic Sandstone	Exceptionally high	Exceptionally high
Primrose Hill	Fylde Permo-triassic Sandstone	Normal	Normal
Richmond Park	Rufford Permo-triassic Sandstone	Exceptionally high	Exceptionally high

Skirwith	Eden Valley And Carlisle Basin Permo-triassic Sandstone	Notably high	Notably high
Victoria Road Entrance	West Lancashire Quarternary Sand And Gravel Superficial Deposits	Normal	Normal