

Monthly water situation report: North West England

1 Summary – July 2024

1.1 Rainfall

Rainfall for North West England for July was classed as normal with recording 106% of the long term average (LTA). The Cumbria and Lancashire (CLA) area observed 102% of the LTA while the Greater Manchester, Merseyside and Cheshire (GMC) area observed 132% of the LTA, both classed as normal.

During July the rainfall across all hydrological areas in North West England were classed as normal with the exception of the Cheshire Rivers group which was classed as above normal. The highest rainfall (in terms of the LTA) was recorded in the Cheshire Rivers Group hydrological area with 156% of the LTA and the lowest was recorded in the Ribble hydrological area with 80% of the LTA.

Over the last 3 months rainfall was classed between normal and notably high, all of GMC being classed as above normal with greater variation seen in CLA. Normal rainfall was recorded in:

- Esk (Dumfries)
- Esk (Cumbria)
- Wyre and Lune
- Ribble

While above normal rainfall was recorded in:

- Derwent
- Kent

The only hydrological area to record notably high rainfall over the last three months was the Eden.

Due to the extremely wet weather recorded before June and July the 6-month cumulative rainfall totals show all hydrological areas across the North West being classed as exceptionally high with the exception of the Esk (Dumfries). It was the fifth wettest 6-month period ending in July since 1871 for North West England, the fourth wettest for CLA and third wettest for GMC.

Similarly, the 6-month period also ranked for the hydrological areas as follows:

- Third wettest for:
 - ❖ Cheshire rivers group
 - ❖ Kent
 - ❖ Douglas
- Fourth wettest for:
 - ❖ Derwent
 - ❖ Eden
- Fifth wettest for:
 - ❖ Esk (Cumbria)
 - ❖ Ribble
 - ❖ Wyre and Lune

The 12-month cumulative rainfall totals continue the pattern shown in the 6-month totals with all hydrological areas being classed as exceptionally high with the exception of the Esk (Cumbria) which is classed as normal. It was the wettest 12-month period ending in July since 1871 for all hydrological areas with the exception of the Ribble and the Esk (Dumfries), with:

- North West England at 1647mm beating the previous record of 1580mm in 2020
- CLA at 1864mm beating the previous record of 1786mm in 2016
- GMC at 1291mm beating the previous record of 1190mm in 2007
- The Esk (Cumbria) at 2270mm beating the previous record of 2186mm in 2016
- The Derwent at 1933mm beating the previous record of 1921mm in 2016
- The Eden at 1701mm beating the previous record of 1638mm in 2016
- The Cheshire Rivers Group at 1153mm beating the previous record of 1074mm in 1920
- The Kent at 2438mm beating the previous record of 2222mm in 2016
- The Mersey and Irwell at 1413mm beating the previous record of 1316mm in 2020
- The Douglas at 1384mm beating the previous record of 1259mm in 2020
- The Wyre and Lune at 1895mm beating the previous record of 1873mm in 2020

1.2 Soil moisture deficit and recharge

The drier weather over the second half of July across North West England resulted in soil moisture deficits falling between 10 to 100mm. Levels generally decreased in Cumbria and increased within Lancashire and GMC. Due to previous wet months nearly all areas recorded levels lower than expected for the time of year with the exception of some coastal areas which were higher than expected.

1.3 River flows

Monthly mean river flows for North West England during July were classed as between normal and exceptionally high. Out of the 25 total sites one site was classed as exceptionally high, one site as notably high, 6 sites as above normal and 17 sites as normal.

Due to heavy rainfall within the catchment the highest flow for July (in terms of LTA) was observed in the Kirkby with 191% of the LTA and was classed as exceptionally high. The lowest was in St Michaels with 57% of the LTA and was classed as Normal.

1.4 Groundwater levels

Groundwater levels across North West England for the end of July were classed between exceptionally high and normal. The sites that remained at the same classification were:

- Furness Abbey at exceptionally high
- Priors Heyes at exceptionally high
- Skirwith at exceptionally high
- Richmond Park at exceptionally high
- Brown Bank Lay By at notably high
- Bruntwood Hall at notably high
- Victoria Road at above normal
- Lea Lane at normal

The sites which changed classification were as follows:

- Great Musgrave increased from normal to above normal
- Primrose hill decreased from above normal to normal

Levels at Priors Heyes remain high compared to the 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 decreased from 84% since the end of June to 79% at the end of July, higher than the average of 73% at this time of the year and higher than this time last year when the storage was at 72%.

At the end of July, reservoir storage (in terms of percentage) was highest at Crummock water which was 100% full. Storage was lowest at Longdendale at 73%. The combined storage at Haweswater and Thirlmere was 77% which is higher than the average of 61% and higher than this time last year when the storage was 60%.

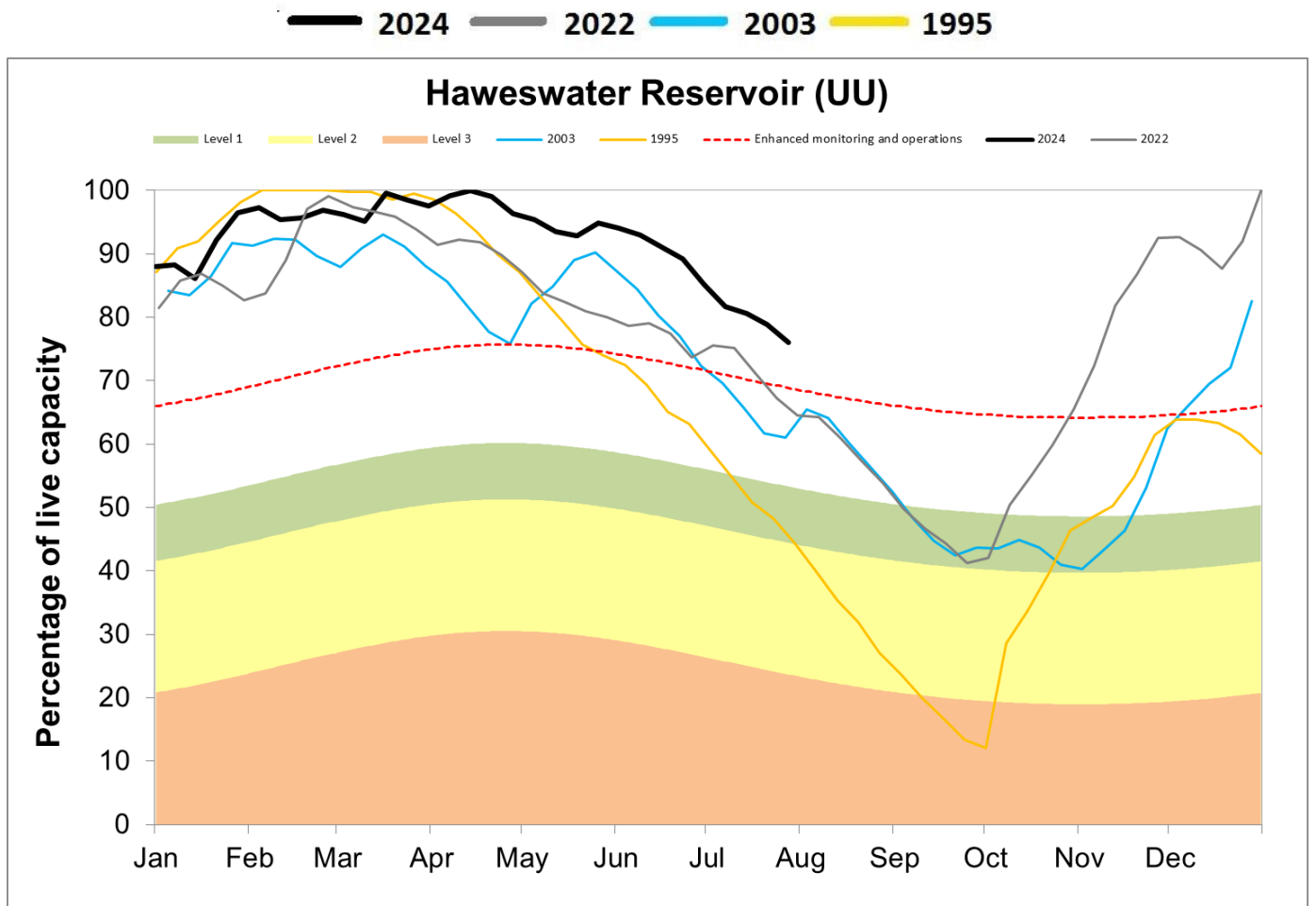
Reservoirs kept low for maintenance work include:

- Torside
- Woodhead
- Anglezarke
- High Bullough
- Arley

- Worthington
- Dingle
- Jumbles
- Harlock
- Kitcliffe
- Piethorne
- Readycon Dean
- Ogden Lower
- Ogden Upper
- Barnacre North
- Barnacre South
- Alston No.2
- Cragg
- Ridegate

All data are provisional and may be subject to revision. The views expressed in this document are not necessarily those of the Environment Agency. Its officers, servants or agents accept no liability for any loss or damage arising from the interpretation or use of the information, or reliance upon views contained herein.

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)).

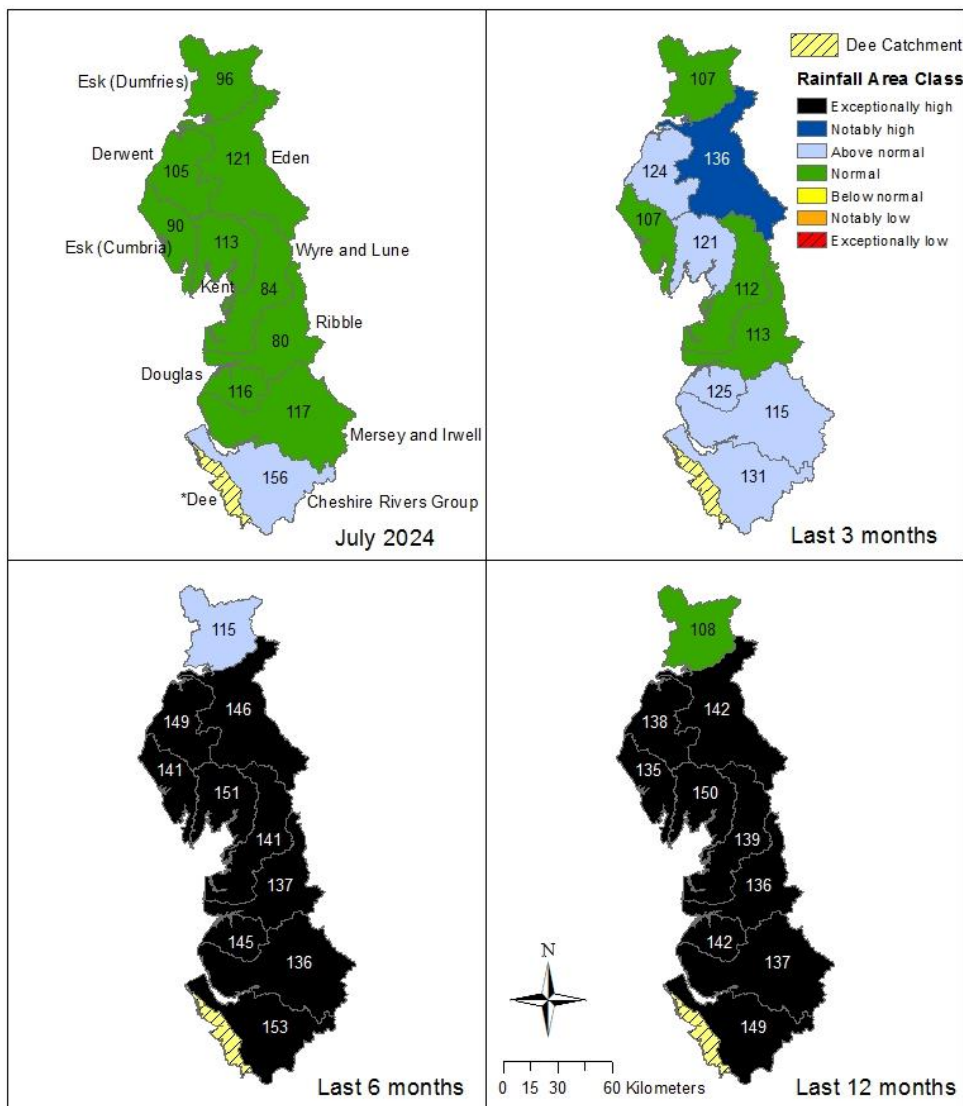


Author: Greater Manchester Merseyside and Cheshire Hydrology Team,
hydrology.GMMYCH@environment-agency.gov.uk

2 Rainfall

2.1 Rainfall map

Figure 2.1: Total rainfall (as a percentage) for hydrological areas for the current month (up to 31 July 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.



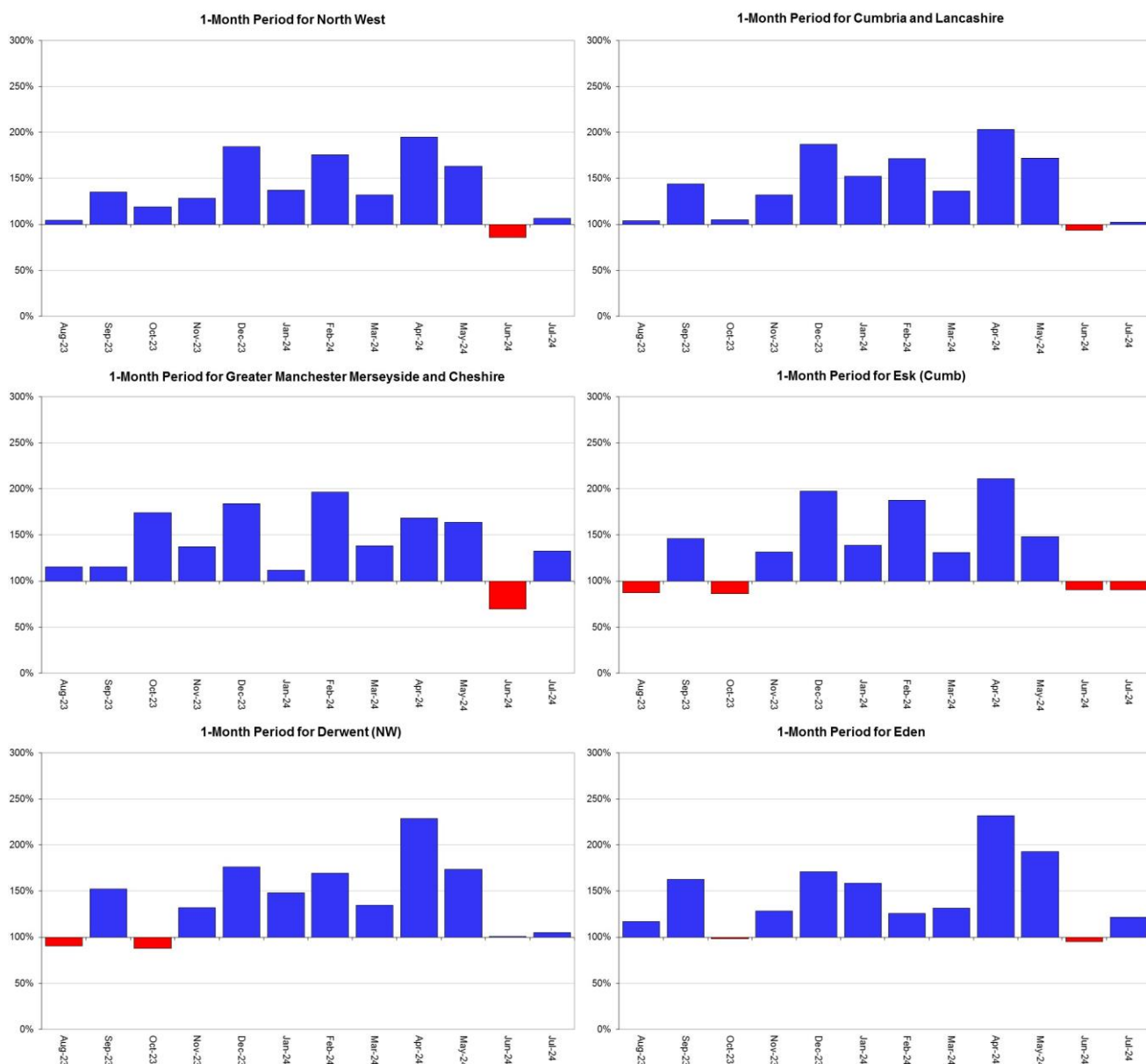
Rainfall data since 2023, extracted from Environment Agency 1km gridded rainfall dataset derived from Environment Agency intensity rain gauges. (Source: Environment Agency. Crown Copyright, 100024198, 2024). Rainfall data prior to 2023, extracted from Met Office HadUK 1km gridded rainfall dataset derived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

2.2 Rainfall charts

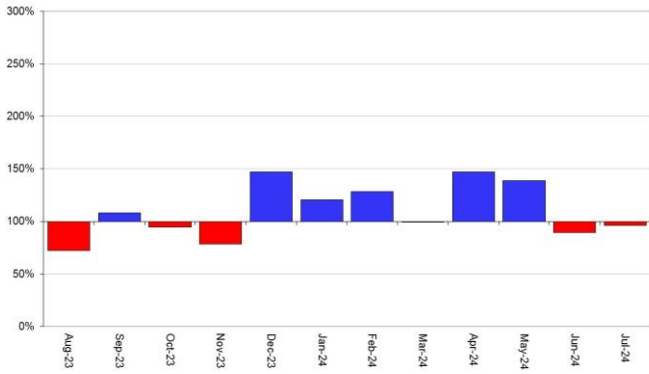
Figure 2.2: Monthly rainfall totals for the past 12 months expressed as a percentage of the 1961 to 1990 long term average for North West England and its hydrological areas.

■ Above average rainfall

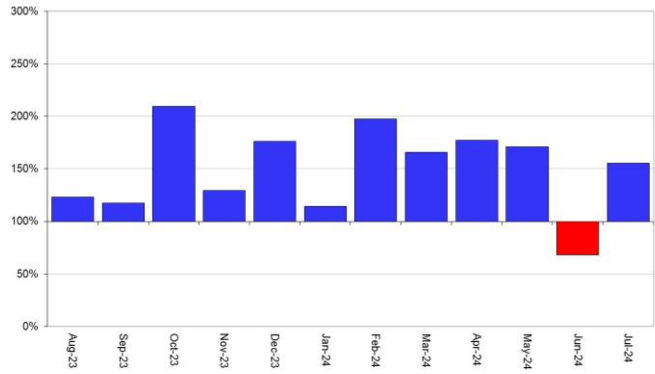
■ Below average rainfall



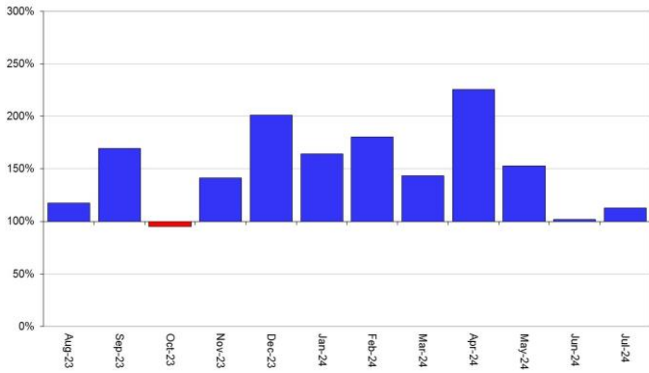
1-Month Period for Esk (Dumfries)



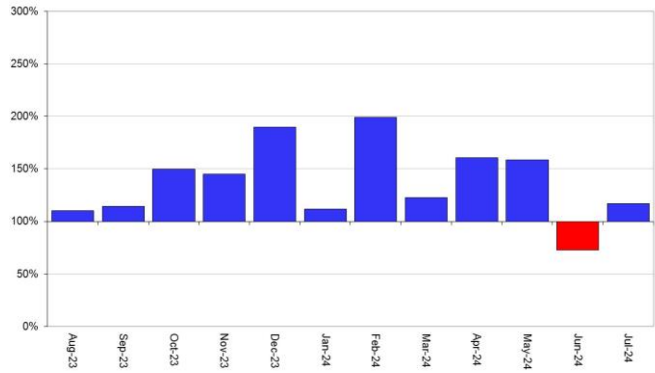
1-Month Period for Cheshire Rivers Group

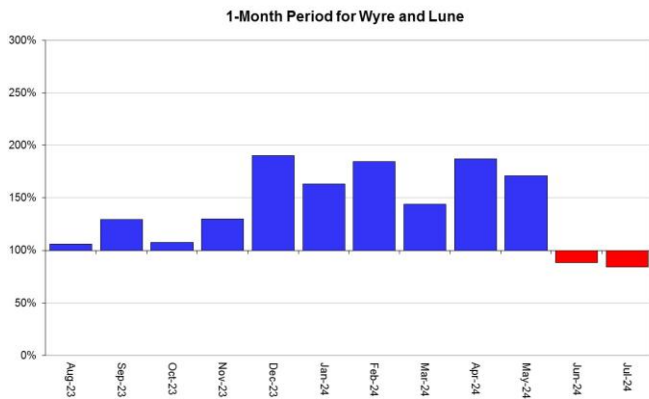
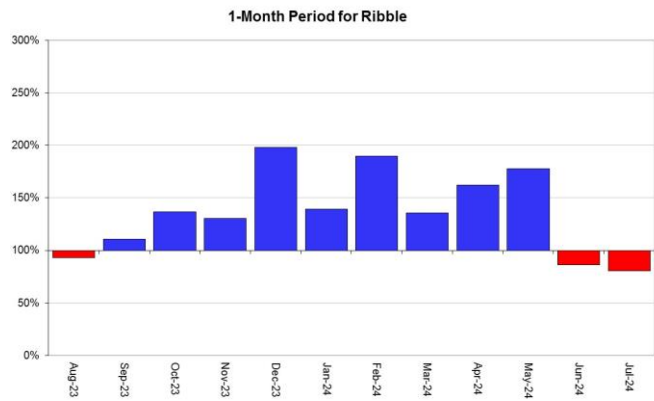
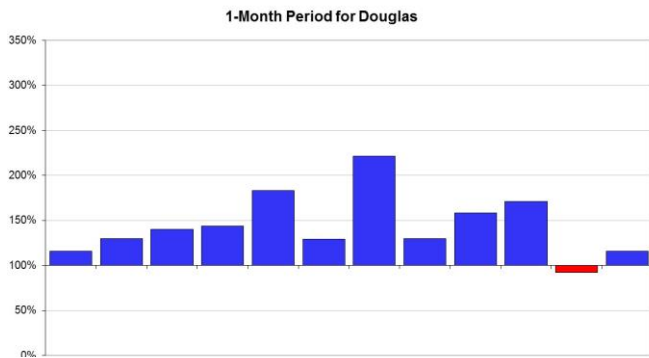


1-Month Period for Kent



1-Month Period for Mersey and Irwell



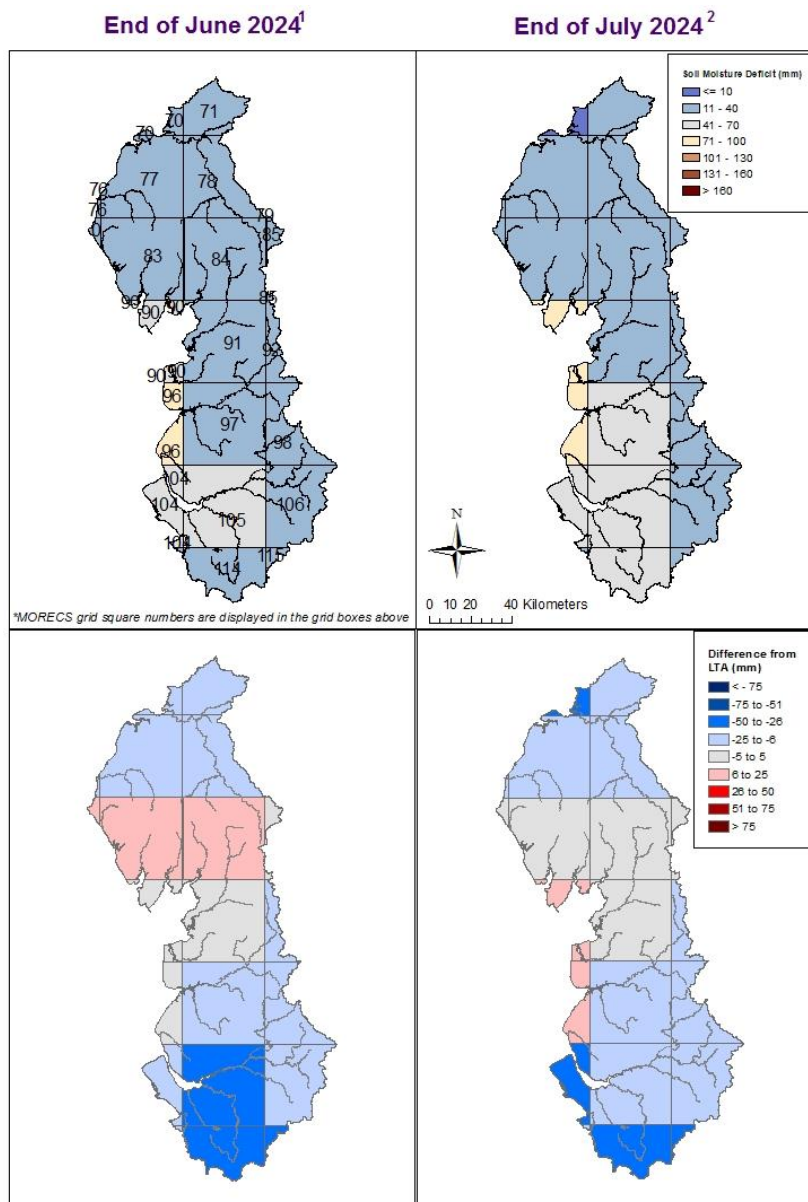


Rainfall data since 2023, extracted from Environment Agency 1km gridded rainfall dataset derived from Environment Agency intensity rain gauges. (Source: Environment Agency. Crown Copyright, 100024198, 2024). Rainfall data prior to 2023, extracted from Met Office HadUK 1km gridded rainfall dataset derived 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 30 June 2024¹ (left panel) and 26 July 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.

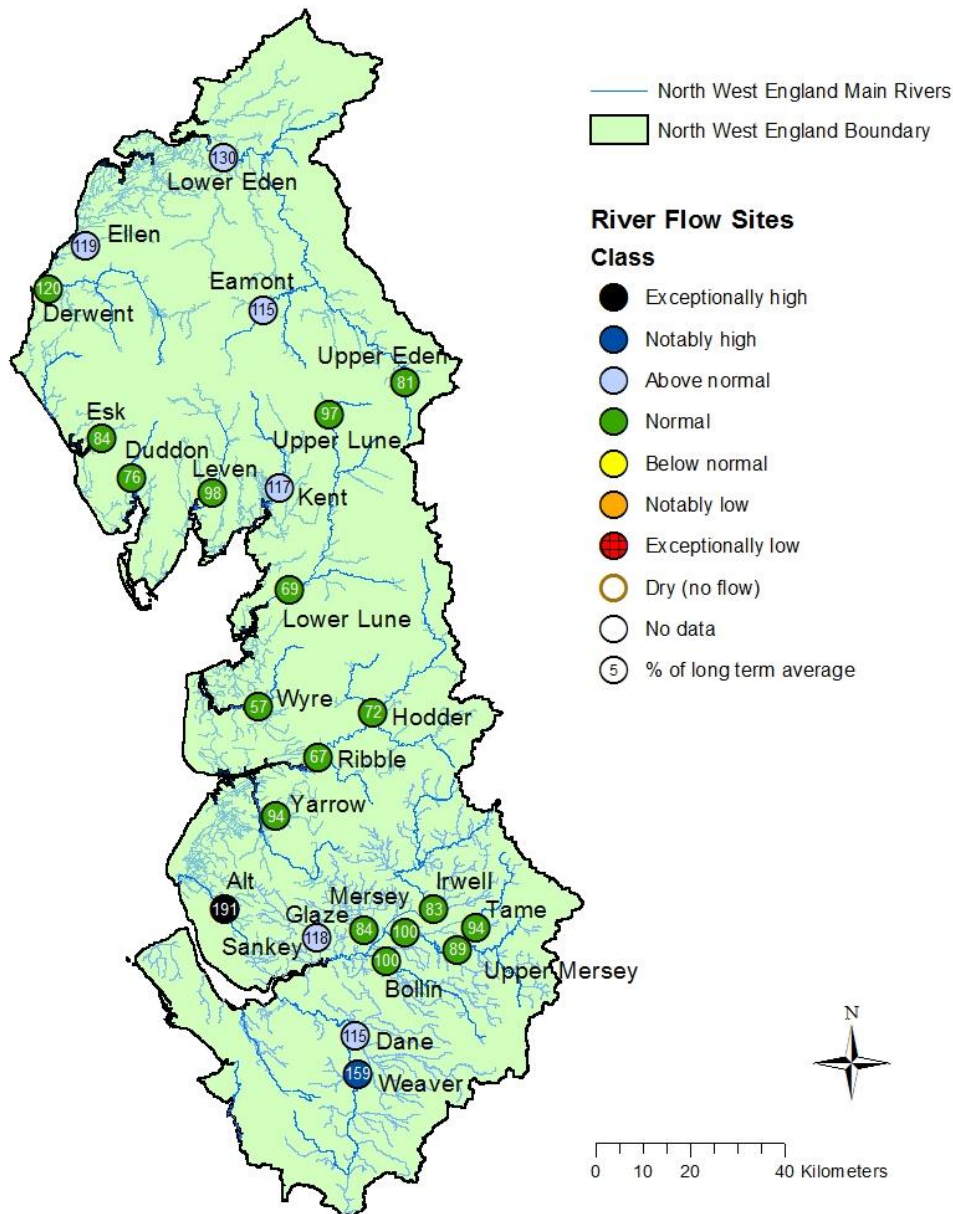


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4 River flows

4.1 River flows map

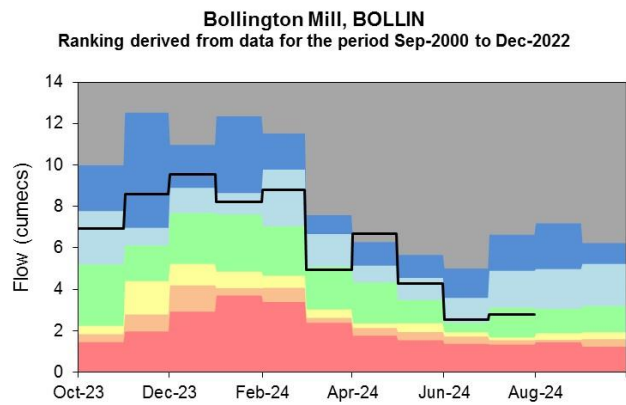
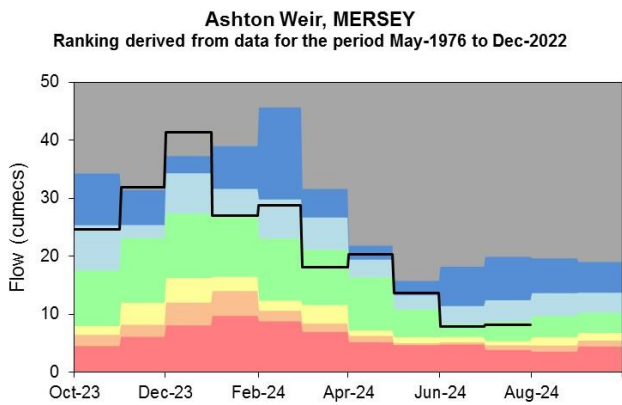
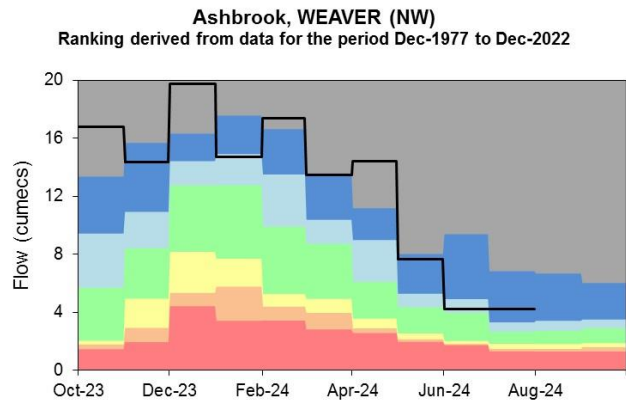
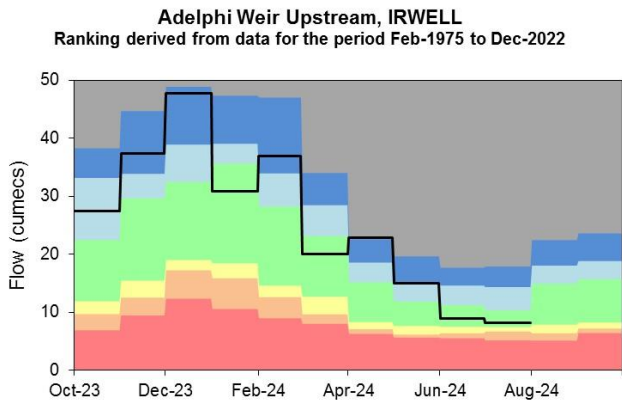
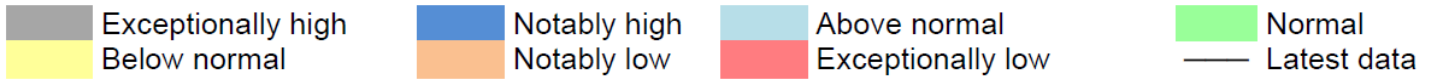
Figure 4.1: Monthly mean river flow for indicator sites for July 2024, expressed as a percentage of the respective long term average and classed relative to an analysis of historic July monthly means. Table available in the appendices with detailed information.



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

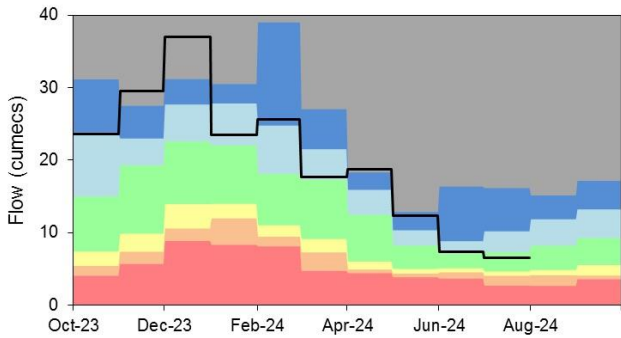
4.2 River flow charts

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



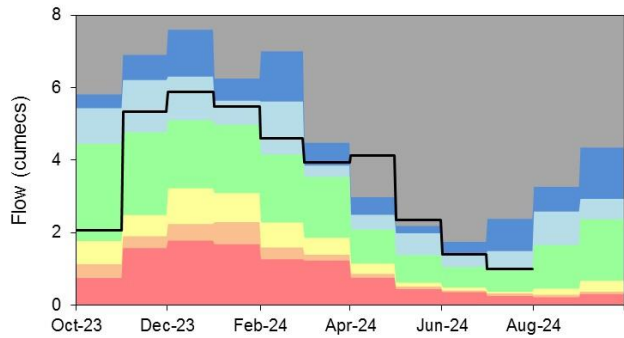
Brinksway, MERSEY

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



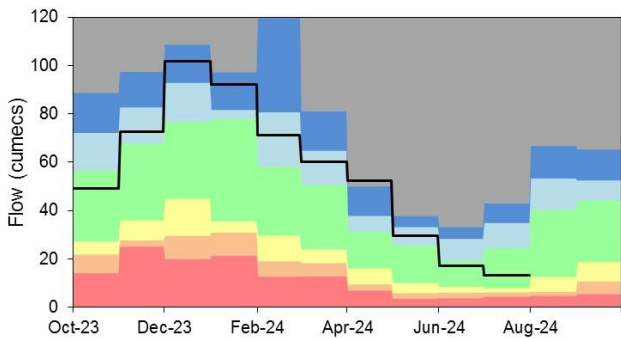
Bullgill, ELLEN

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



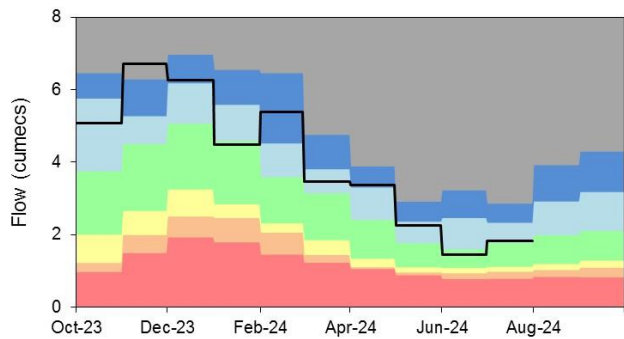
Caton, LUNE

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



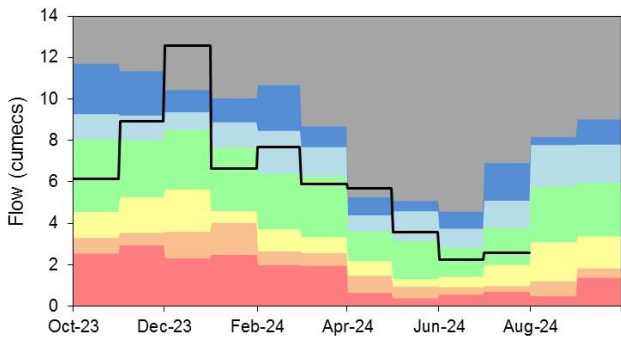
Causey Bridges, SANKEY

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



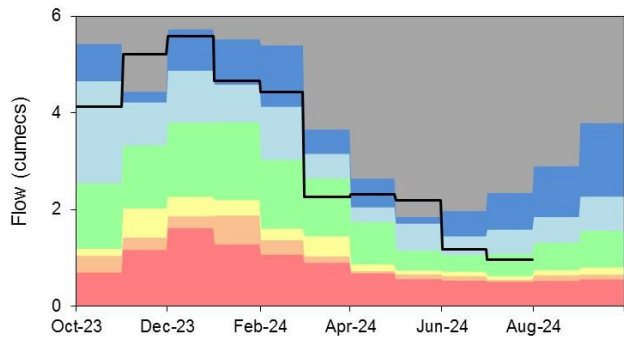
Crople How, ESK (NW)

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

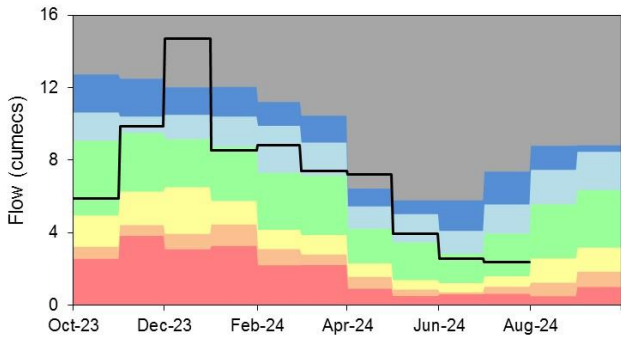


Croston, YARROW

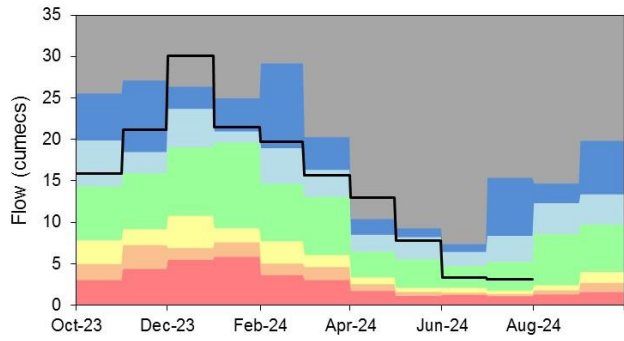
Ranking derived from data for the period Jan-1976 to Dec-2022



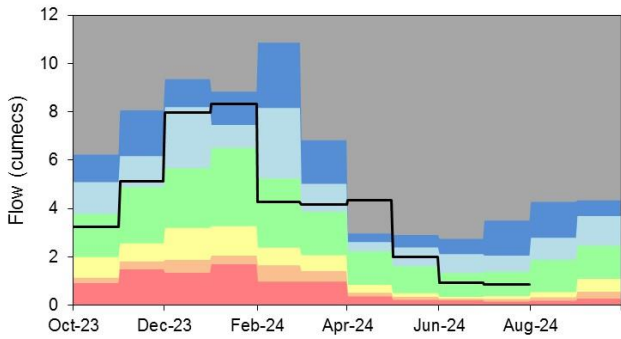
Duddon Hall, DUDDON
Ranking derived from data for the period Mar-1968 to Dec-2022



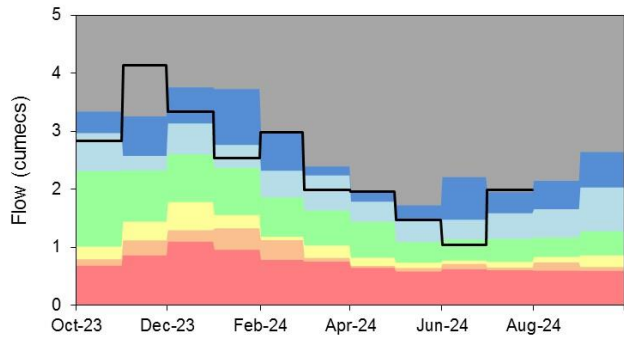
Hodder Place, HODDER
Ranking derived from data for the period Jan-1976 to Dec-2022



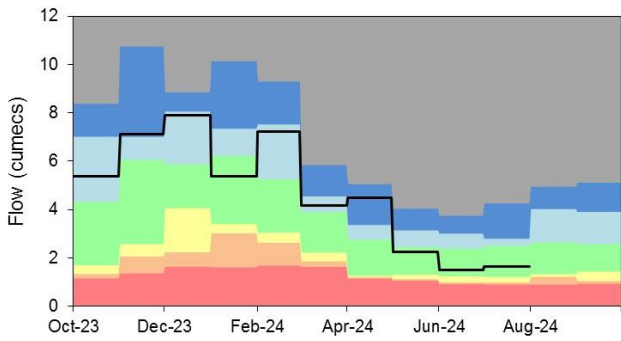
Kirkby Stephen, EDEN (NW)
Ranking derived from data for the period Oct-1971 to Dec-2022



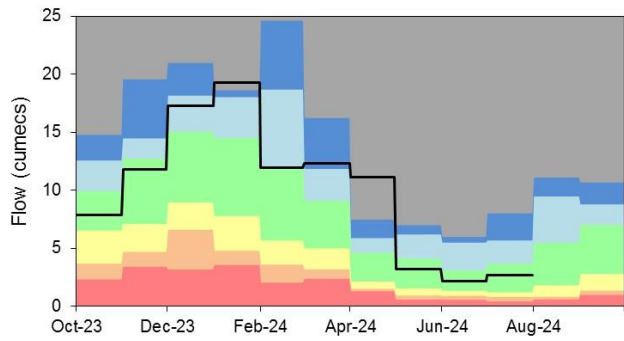
Kirkby, ALT
Ranking derived from data for the period Oct-1977 to Dec-2022



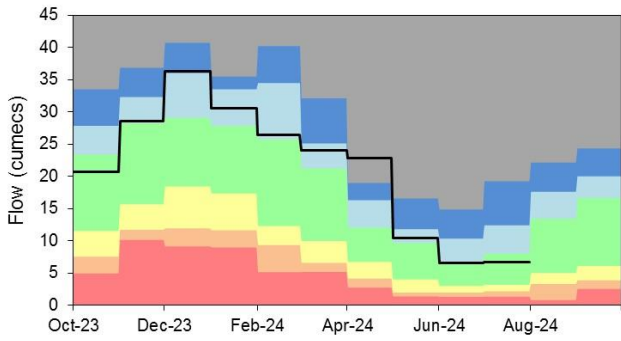
Little Woolden Hall Ultrasonic, GLAZE
Ranking derived from data for the period Jul-1995 to Dec-2022



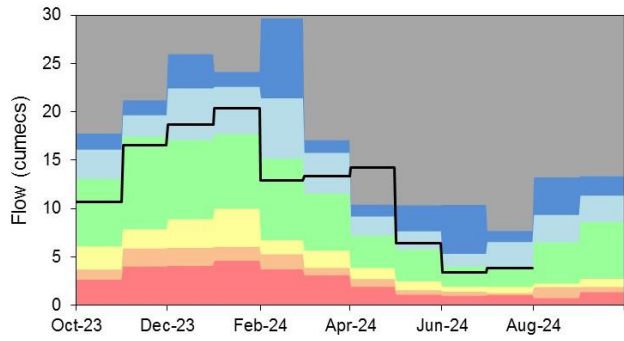
Lunes Bridge, LUNE
Ranking derived from data for the period Dec-1979 to Dec-2022



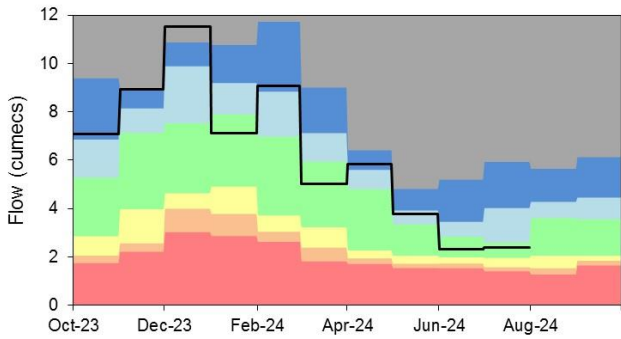
Newby Bridge FMS, LEVEN (NW)
Ranking derived from data for the period Jan-1972 to Dec-2022



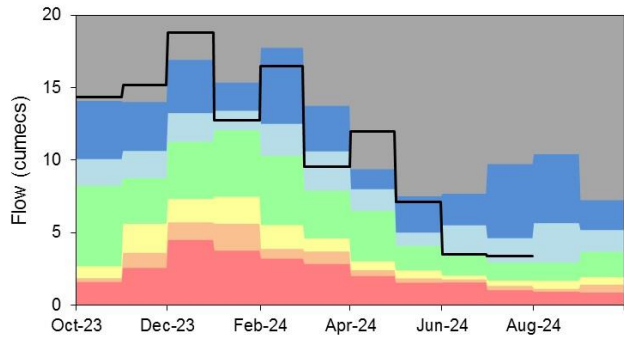
Pooley Bridge, EAMONT
Ranking derived from data for the period Jul-1970 to Dec-2022



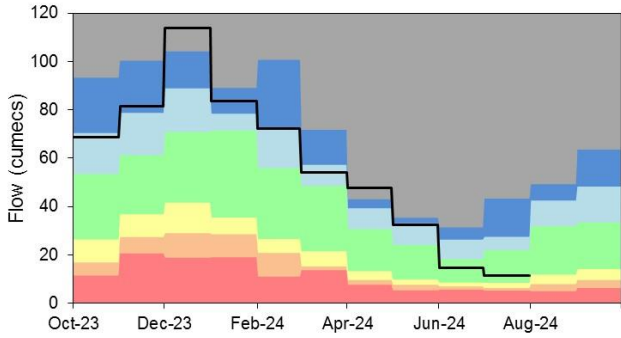
Portwood, TAME
Ranking derived from data for the period Jan-1976 to Dec-2022



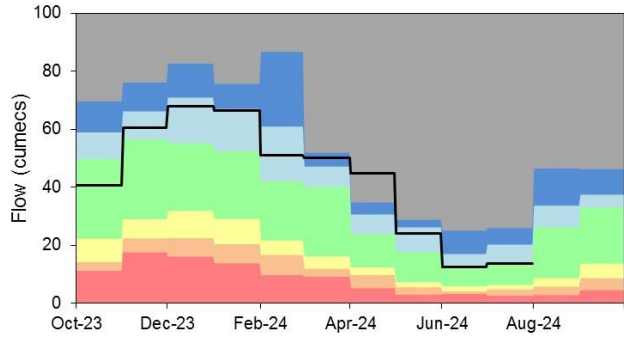
Rudheath, DANE
Ranking derived from data for the period Jan-1976 to Dec-2022



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

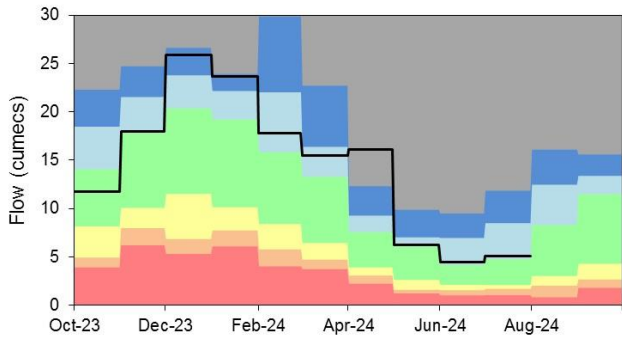


Seaton Mill, DERWENT (NW)
Ranking derived from data for the period Sep-1960 to Dec-2022



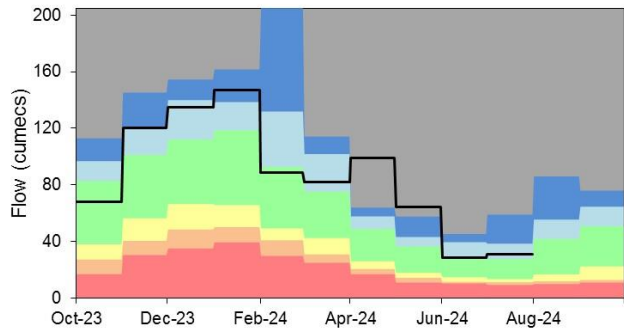
Sedgwick, KENT

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



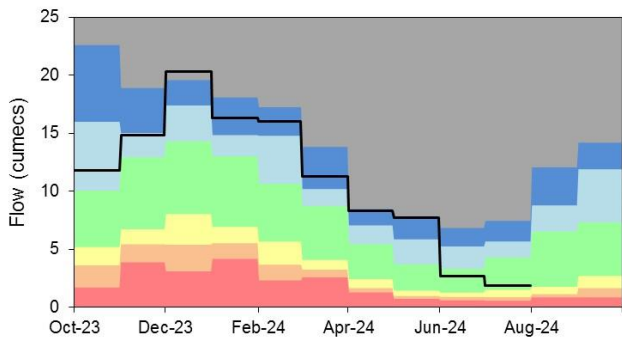
Sheepmount, EDEN (NW)

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

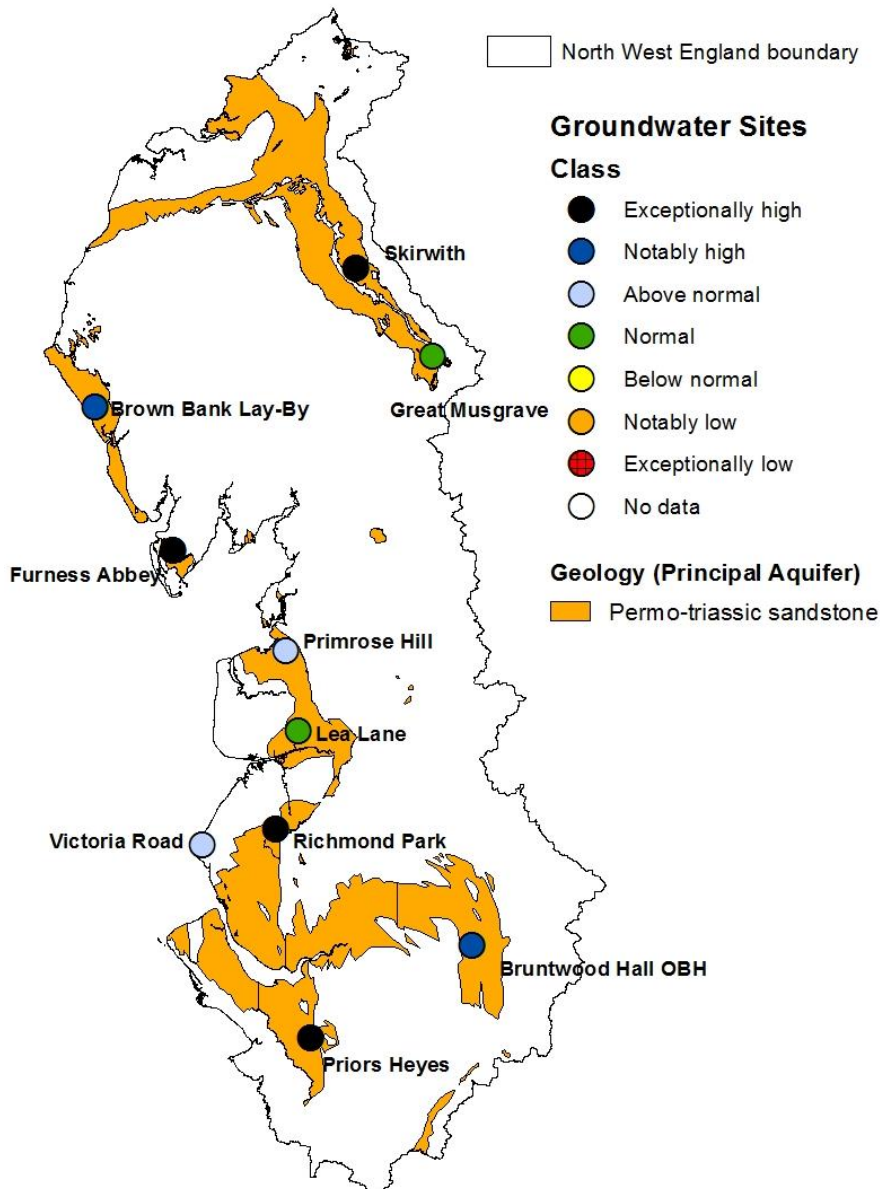


Source: Environment Agency.

5 Groundwater levels

5.1 Groundwater levels map

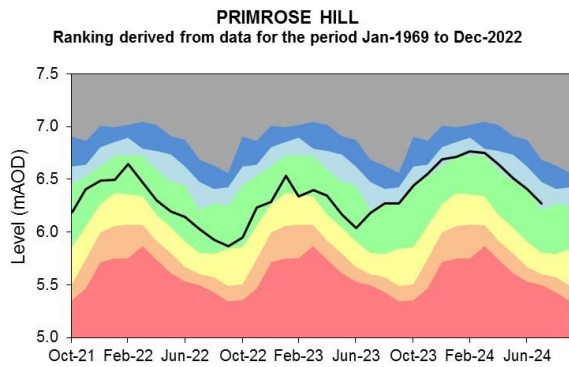
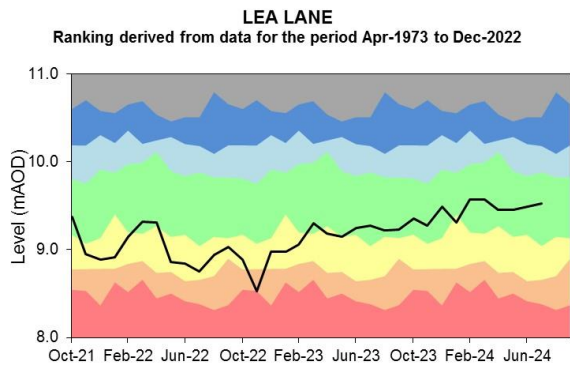
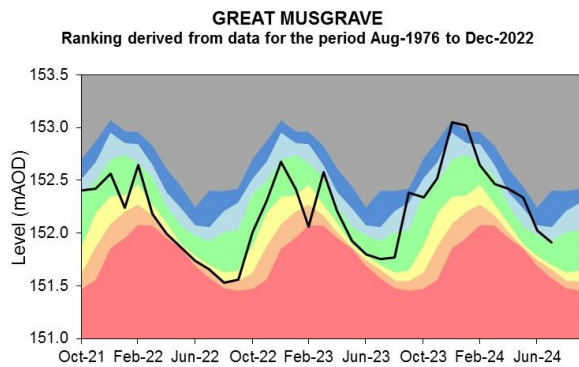
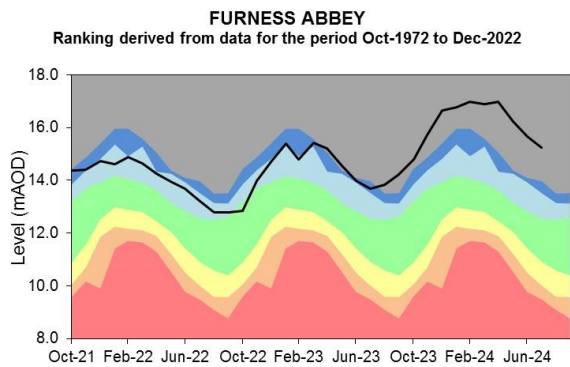
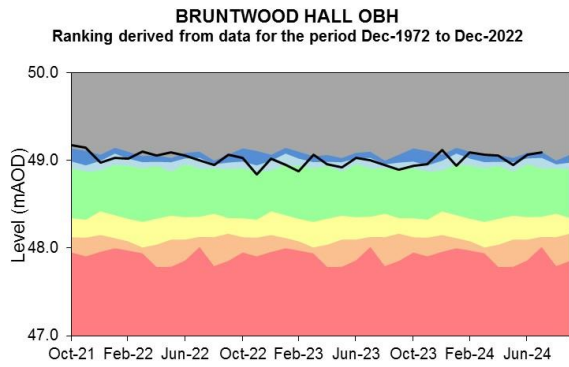
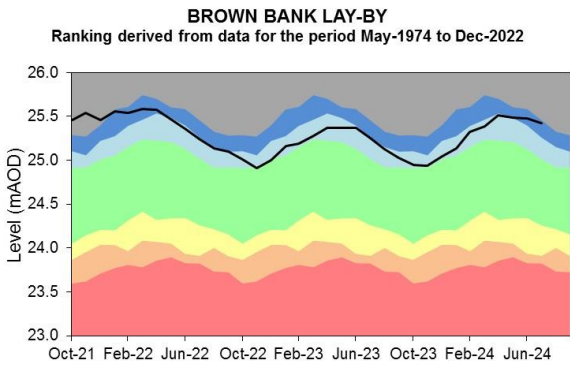
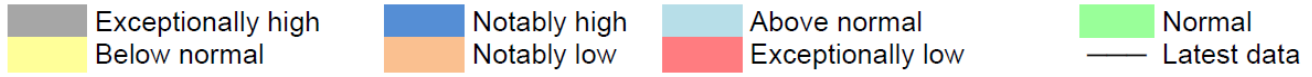
Figure 5.1: Groundwater levels for indicator sites at the end of July 2024, classed relative to an analysis of respective historic July levels. Table available in the appendices with detailed information. Please note Victoria Road Borehole sits within a superficial deposit as opposed to a bedrock aquifer.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

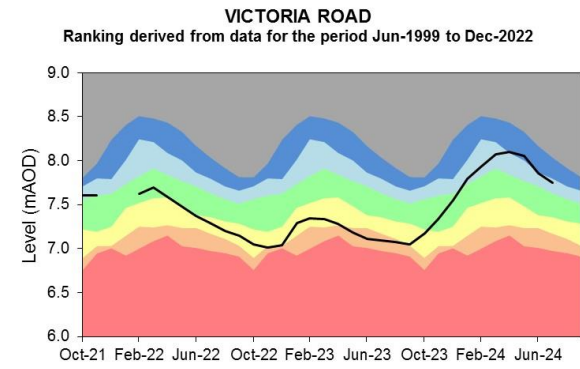
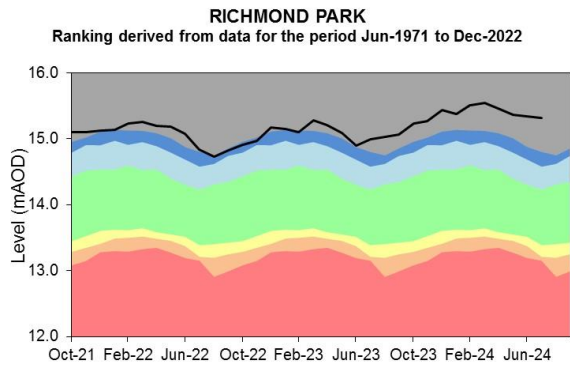
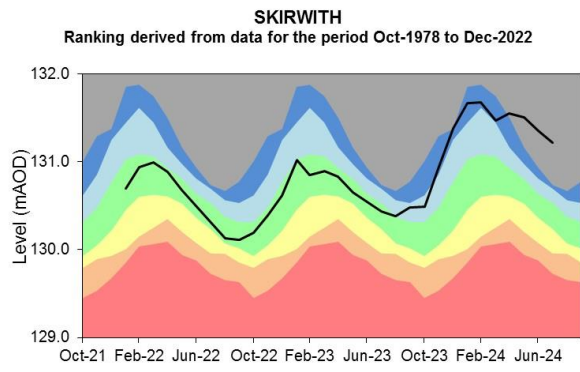
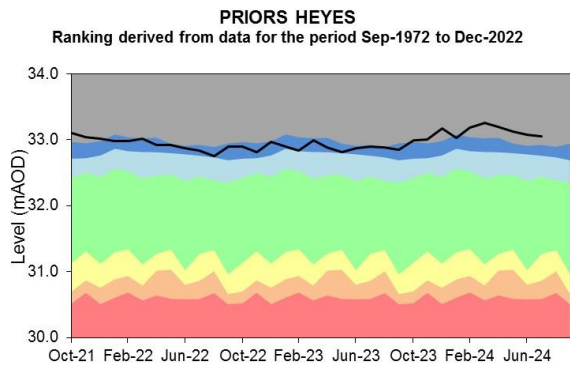


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5.2 Groundwater level charts

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.

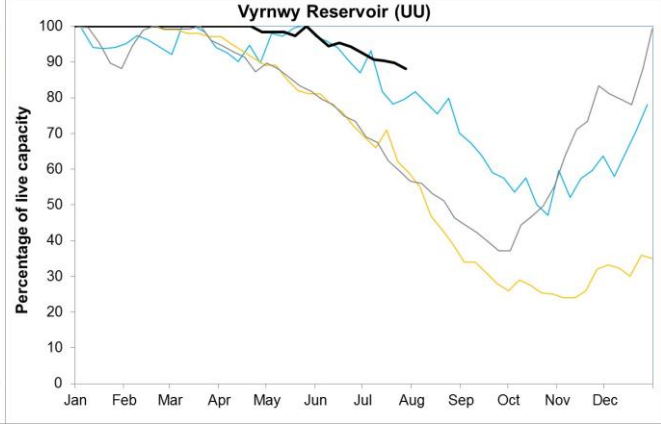
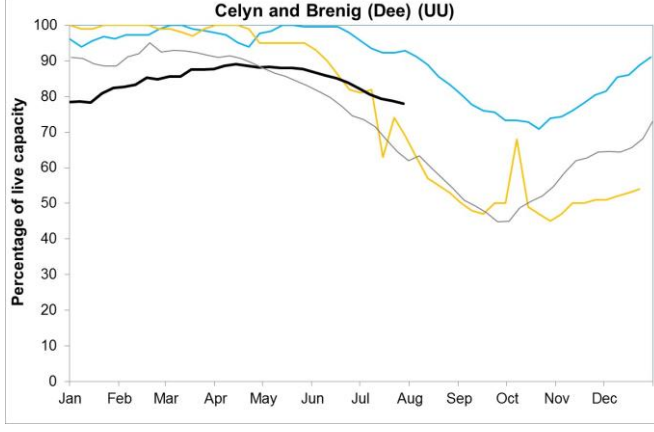
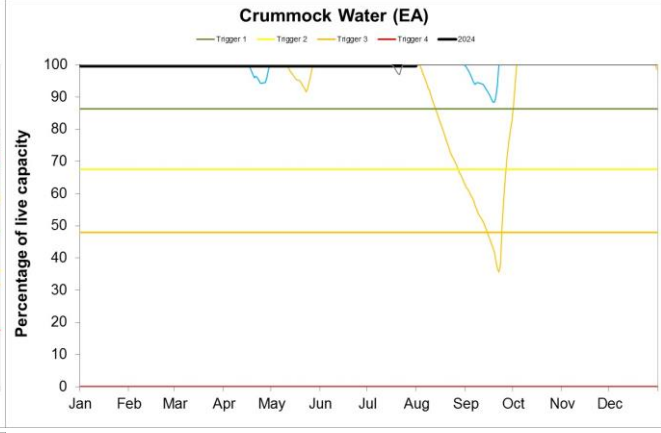
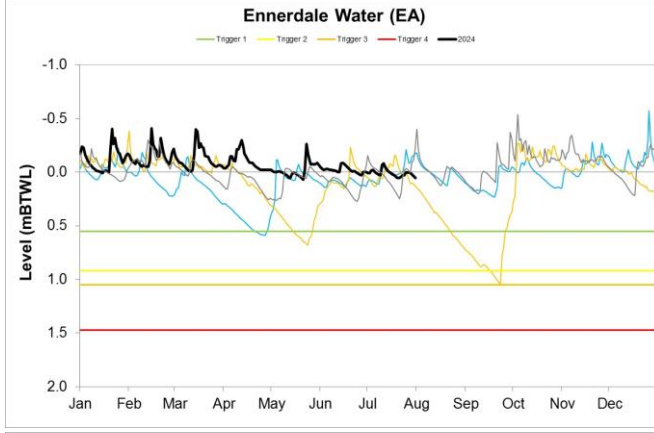
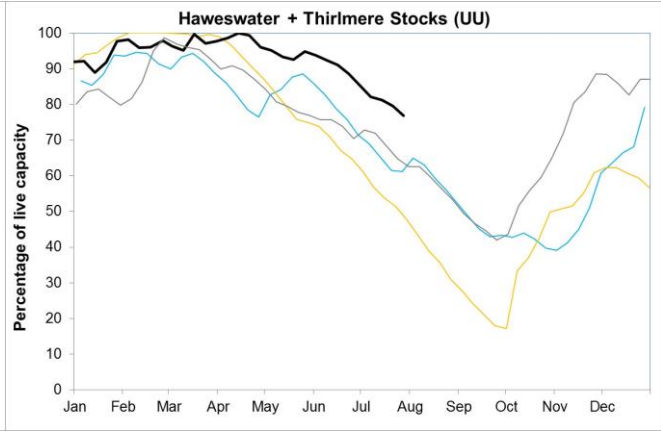
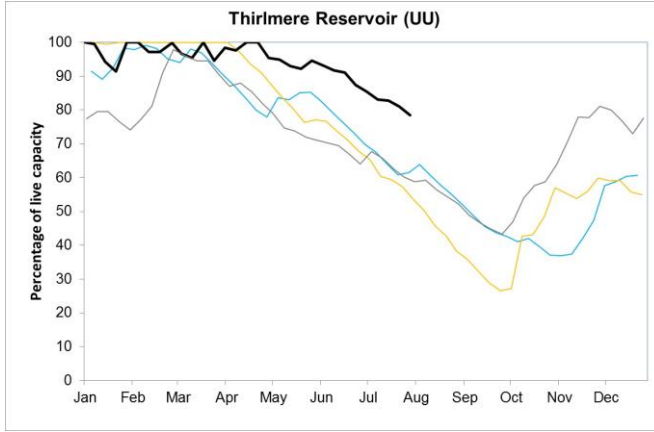
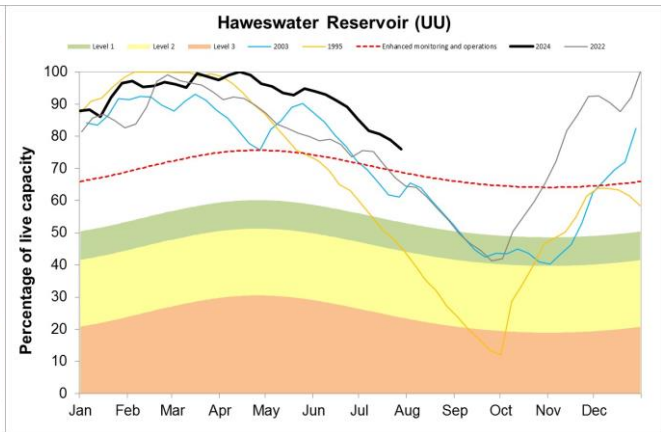
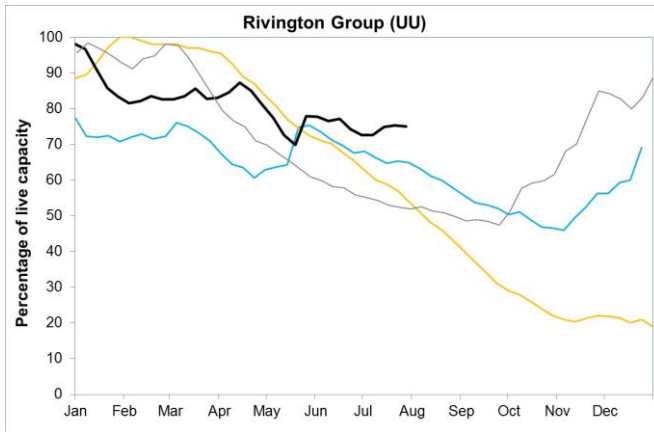




Source: Environment Agency, 2024.

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 | Jul 2024 rainfall % of long term average 1961 to 1990 | Jul 2024 band | May 2024 to July cumulative band | Feb 2024 to July cumulative band | Aug 2023 to July cumulative band |
|-----------------------|---|---------------|----------------------------------|----------------------------------|----------------------------------|
| Cheshire Rivers Group | 156 | Above Normal | Above normal | Exceptionally high | Exceptionally high |
| Derwent (NW) | 105 | Normal | Above normal | Exceptionally high | Exceptionally high |
| Douglas | 116 | Normal | Above normal | Exceptionally high | Exceptionally high |
| Eden | 121 | Normal | Notably high | Exceptionally high | Exceptionally high |
| Esk (Cumbria) | 90 | Normal | Normal | Exceptionally high | Exceptionally high |
| Esk (Dumfries) | 96 | Normal | Normal | Above normal | Normal |
| Kent | 113 | Normal | Above normal | Exceptionally high | Exceptionally high |
| Mersey and Irwell | 117 | Normal | Above normal | Exceptionally high | Exceptionally high |
| Ribble | 80 | Normal | Normal | Exceptionally high | Exceptionally high |

| | | | | | |
|---------------|-----|--------|--------------|--------------------|--------------------|
| Wyre and Lune | 84 | Normal | Normal | Exceptionally high | Exceptionally high |
| North West | 106 | Normal | Above normal | Exceptionally high | Exceptionally high |

8.2 River flows table

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

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

8.3 Groundwater table

| Site name | Aquifer | End of Jul 2024 band | End of Jun 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 | Notably high |
| Furness Abbey | Furness Permo-triassic Sandstone | Exceptionally high | Exceptionally high |
| Great Musgrave | Eden Valley And Carlisle Basin Permo-triassic Sandstone | Normal | Above 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 | Above normal | Normal |
| Richmond Park | Rufford Permo-triassic Sandstone | Exceptionally high | Exceptionally high |

| | | | |
|------------------------|--|--------------------|--------------------|
| Skirwith | Eden Valley And Carlisle Basin Permo-triassic Sandstone | Exceptionally high | Exceptionally high |
| Victoria Road Entrance | West Lancashire Quarternary Sand And Gravel Superficial Deposits | Above normal | Above normal |