Monthly water situation report: North-west England

1 Summary – December 2024

1.1 Rainfall

December saw changeable weather, with days of heavier rainfall interspersed with periods of calmer weather dominated by high-pressure systems. The heaviest rain was observed on the last day of December , with an average of 82mm of rainfall recorded across all 9 indicator sites on 31 December.

December's rainfall for north-west England as a whole was classed as above normal, at 139% of the long-term average (LTA). Rainfall across Cumbria and Lancashire was classed as above normal, at 133% of the LTA. Greater Manchester, Merseyside and Cheshire (GMC) observed 163% of the LTA, classed as notably high.

Rainfall totals were generally higher towards the south of north-west England, and towards the coast, particularly across GMC and Lancashire. The highest rainfall (in terms of the LTA) was observed in the Cheshire Rivers Group hydrological area (164% of the LTA), classed as notably high. The lowest rainfall (in terms of the LTA) was observed in the Esk (Dumfries) hydrological area (117% of the LTA), classed as normal.

Similarly, for the 3-month cumulative rainfall period ending in December, the Cheshire Rivers Group hydrological area in particularly is wetter than hydrological areas further north, classed as notably high. This is followed by the Douglas hydrological area which was classed as above normal. The remaining hydrological areas were all classed as normal.

The 6-month cumulative rainfall period, sees a similar trend. With the Cheshire Rivers Group hydrological area being significantly wetter than elsewhere and classed as exceptionally high. This is followed by the Douglas, the Kent, and the Esk (Cumbria) hydrological area which were classed as above normal. The remaining hydrological areas were all classed as normal.

The 12-month cumulative rainfall totals, which provide an illustration of rainfall observed during 2024, illustrates how wet the first half of 2024 was, with all hydrological areas being classed as notably high or exceptionally high, despite lower rainfall totals in recent months. In particular, the Cheshire Rivers Group, the Douglas, the Kent, and the Esk (Cumbria) hydrological areas were all classed as exceptionally high.

Overall, 2024 was the 9th wettest year on record since 1871 (153 years) for north-west England as a whole. Notably for the Cheshire Rivers Group hydrological area, this was the 2nd wettest year on record, at 1107mm, behind the 1872 record of 1187mm.

1.2 Soil moisture deficit and recharge

Please be aware we have now changed to reporting soil moisture deficits (SMD) on a hydrological area basis in line with our rainfall reporting. As such, we have also updated the map display in Figure 3.1 accordingly.

Due to heavy rainfall recorded on New Year's Eve and New Year's Day, Soils across north-west England have remained saturated at the beginning of January. SMD levels were lower than, or expected for the LTA for this time of year, particularly across Cheshire.

1.3 River flows

Similar to the spatial pattern in rainfall, the highest mean river flows (in terms of percentage of the LTA) were generally found towards the south of north-west England, particularly across GMC. River flows were highest (in terms of percentage of the LTA) in the Weaver catchment at Ashbrook (184% of the LTA, classed as exceptionally high), and lowest in the Ellen catchment at Bulgill (77% of the LTA, classed as normal) due to lower than average rainfall within the Ellen catchment.

For the other 23 indicator sites reported:

- 1 site, Rudheath, was classed as notably high
- 6 sites were classed as above normal
- 16 sites were classed as normal

Heavy rainfall recorded across north-west England on 31 December resulted in several notable peaks in daily mean flow.

Daily mean flows above Q1 (this is where mean flow has been exceeded only 1% of the time during the lifespan of the gauging station) were recorded on 31 December at:

- Bulgill gauging station on the River Ellen
- Duddon Hall gauging station on the River Duddon
- Kirkby gauging station on the River Alt
- Sedgwick gauging station on the River Kent
- St Michaels gauging station on the River Wyre
- Ashton Weir gauging station on the River Mersey
- Causey Bridges gauging station on Sankey Brook
- Little Woolden Hall gauging station on Glaze Brook

In addition, daily mean flows above Q0.1 (where mean flow has been exceeded only 0.1% of the time) were recorded on 31 December at:

- Caton gauging station on the River Lune
- Croston gauging station on the River Yarrow
- Hodder Place gauging station on the River Hodder
- Lunes Bridge gauging station on the River Lune
- Samlesbury gauging station on the River Ribble
- Adelphi Weir gauging station on the River Irwell
- Brinksway gauging station on the River Mersey
- Portwood gauging station on the River Tame

1.4 Groundwater levels

Groundwater levels across north-west England at the end of December were classed between normal and exceptionally high. Groundwater levels at:

- Skirwith, decreased, from notably high to above normal
- Bruntwoood Hall, increased, from notably high to exceptionally high

All other indicator sites remained at the same classification at:

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

Please note, 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 storage

Total reservoir storage for north-west England increased from 78% from the end of November, to 82% at the end of December. This is lower than the average of 89% at this time of the year, and lower than this time last year when total reservoir storage was 88%.

At the end of December, reservoir storage (in terms of percentage was highest at Crummock Water, and Ennerdale Water, both remaining at 100% full. This was followed by the Dee

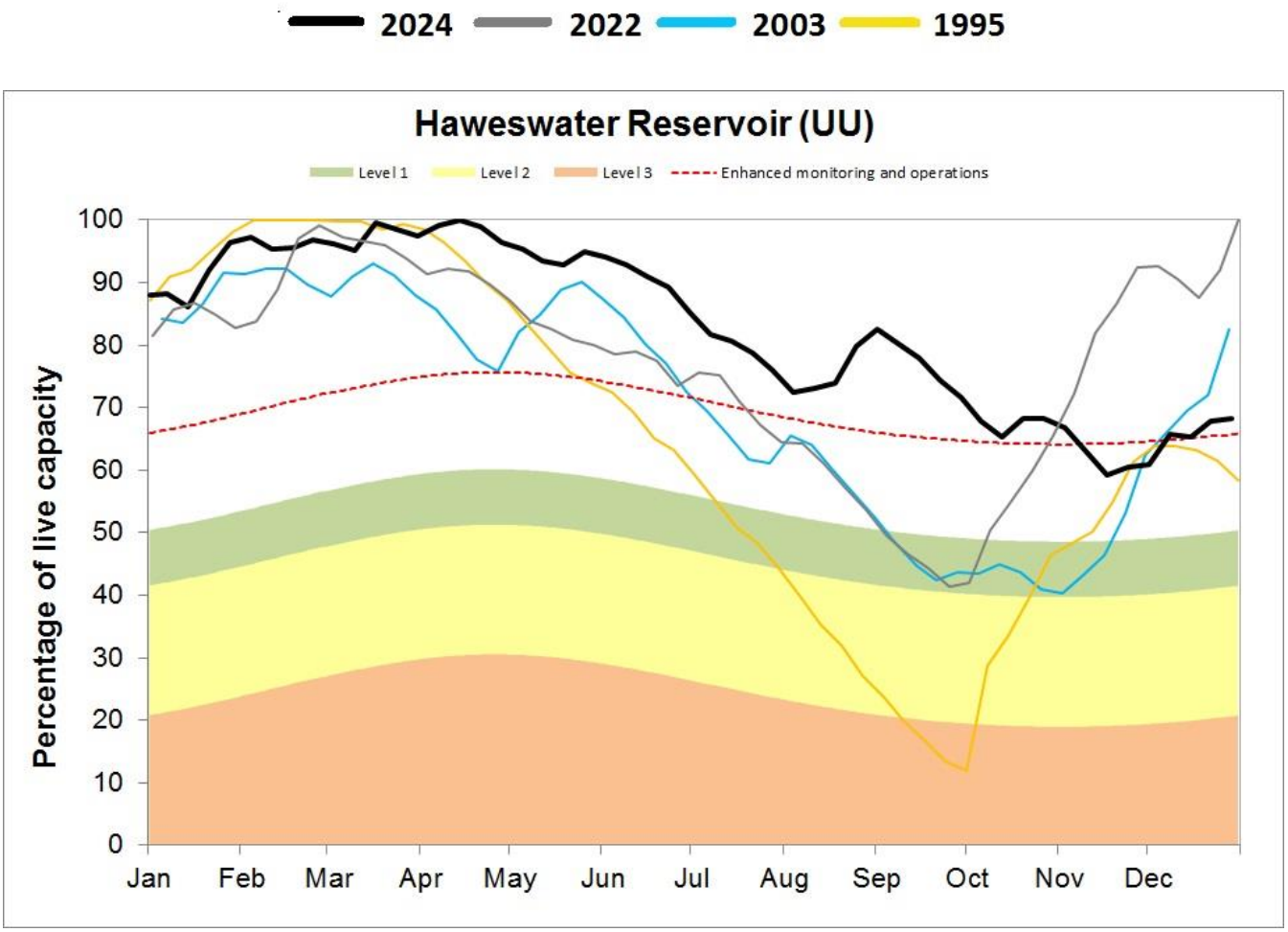
(Celyn and Brenig) system which was 98% full. Reservoir storage remain lowest at Haweswater (in terms of percentage), which was 68% full.

The combined storage at Haweswater and Thirlmere was at 72%. This is lower than the average of 86% at this time of the year, and lower than this time last year when storage was 84%.

Reservoirs kept low for maintenance works include part of the:

- Longdendale system – Audenshaw No.1, Torside
- Rivington system – Anglezarke, and High Bullough
- Bolton supply system – Dingle
- Piethorne Valley system – Norman Hill, Kitcliffe, and Rooden
- Ogden (Barley) system – Ogden Lower, and Ogden Upper
- Barnacre Group system – Barnacre North
- Longridge system - Alston No.1, Alston No.2, and Spade Mill No.2
- Dee (Celyn and Brenig) system – Llyn Celyn
- Dubbs system – Dubbs
- Watergrove system – Watergrove

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)).

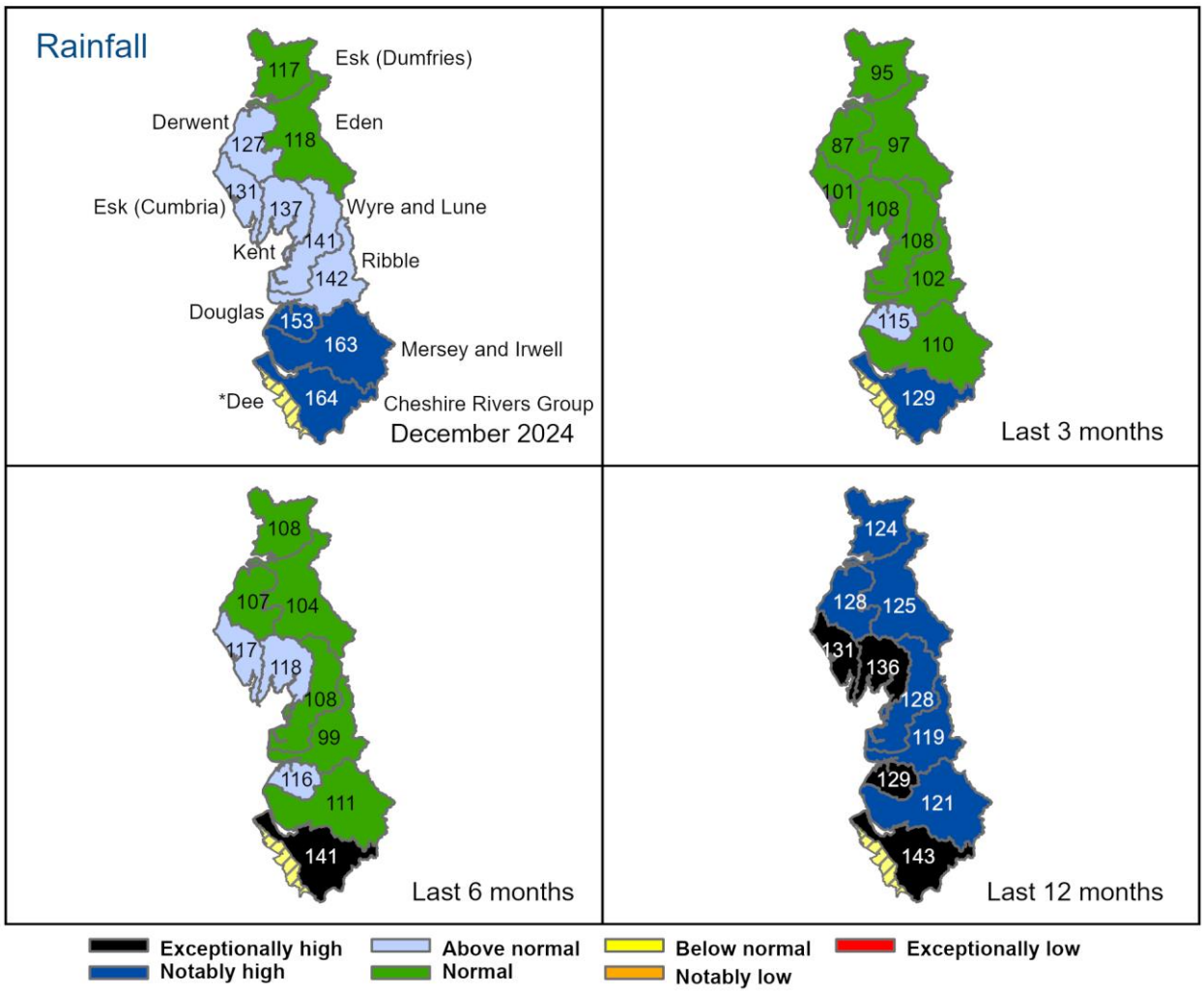


Author: Cumbria and Lancashire Hydrology Team, hydrology.CMBLNC@environment-agency.gov.uk

2 Rainfall

2.1 Rainfall map

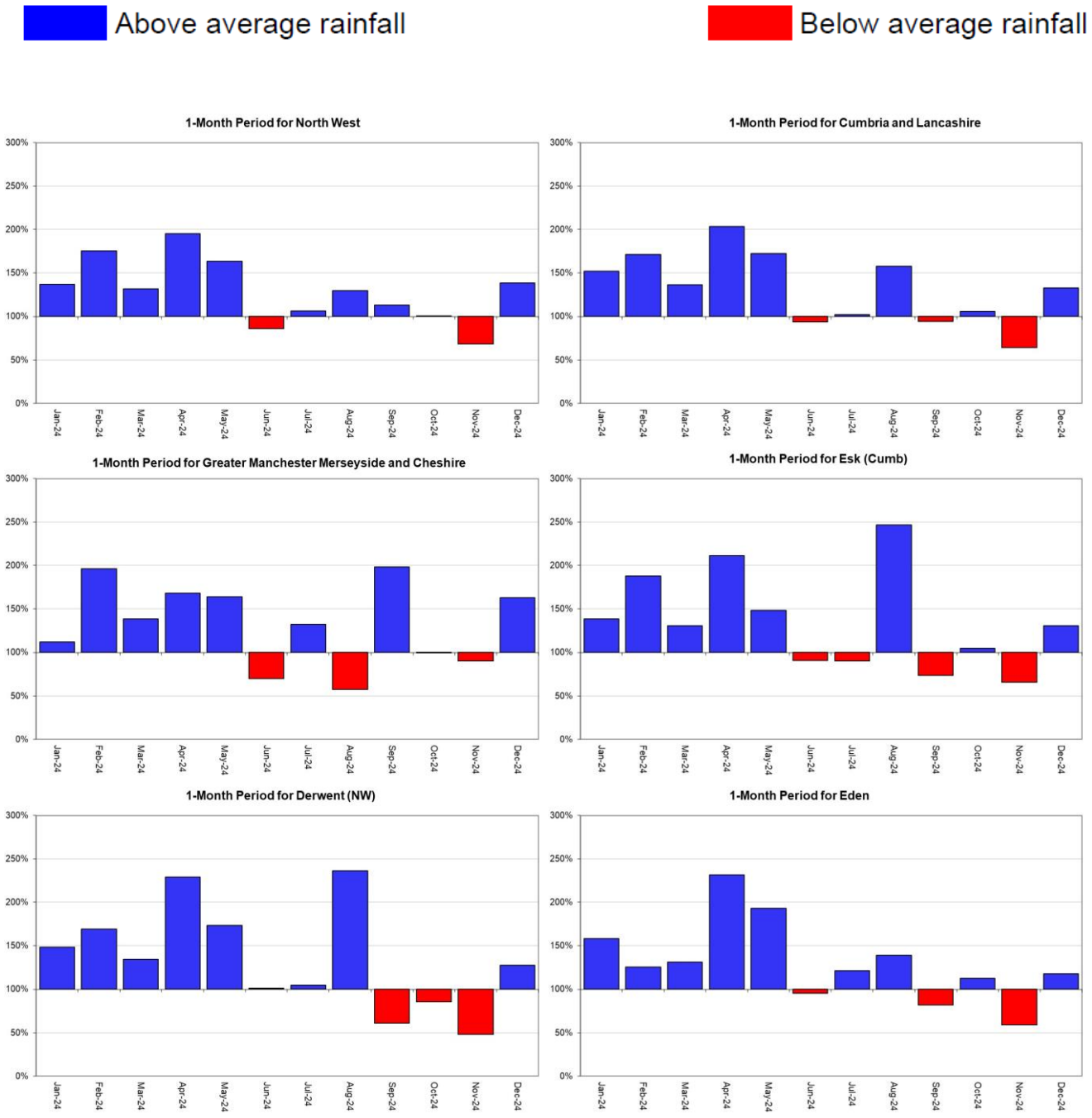
Figure 2.1: Total rainfall (as a percentage) for hydrological areas for the current month (up to 31 December 2024), the last 3 months, the last 6 months, and the last 12 months, classed relative to an analysis of respective historic totals. Table available in the appendices with detailed information.

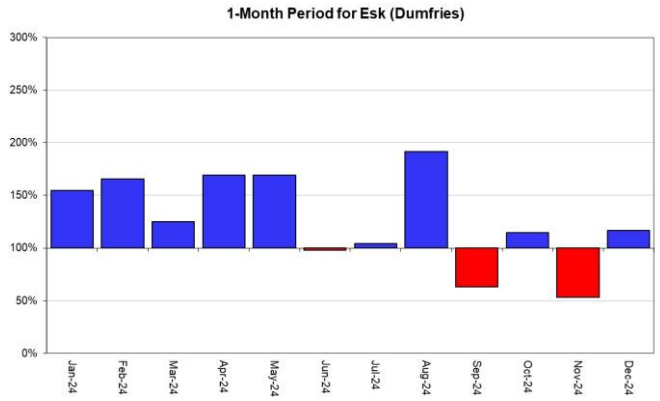


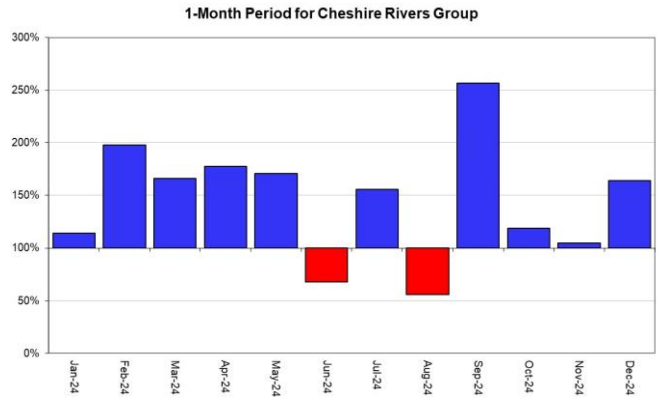
Rainfall data since 2023, extracted from Environment Agency 1km gridded rainfall dataset derived from Environment Agency intensity rain gauges. (Source: Environment Agency. Crown Copyright, 100024198, 2025). Rainfall data prior to 2023, extracted from Met Office HadUK 1km gridded rainfall dataset derived from registered rain gauges (Source: Met Office. Crown copyright, 2025).

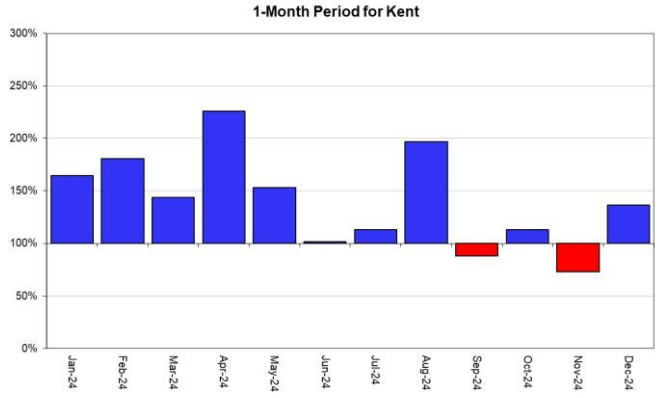
2.2 Rainfall charts

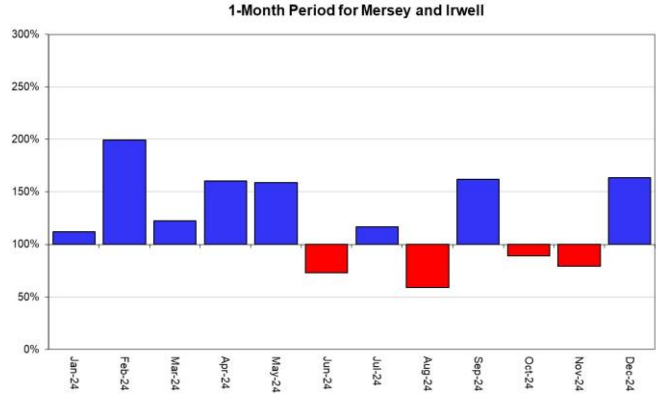
Figure 2.2: Monthly rainfall totals for the past 12 months expressed as a percentage of the 1961 to 1990 long term average for North-west England and its hydrological areas.

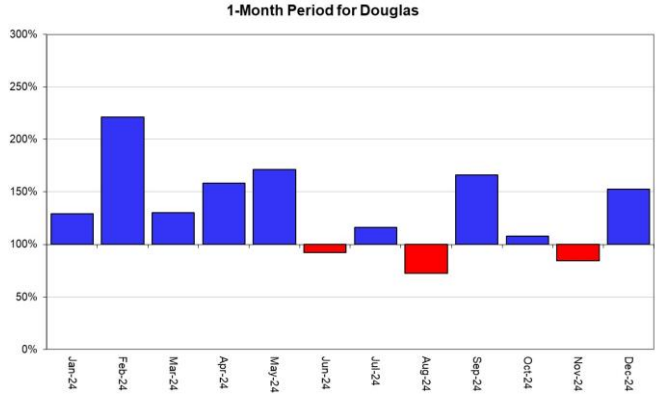


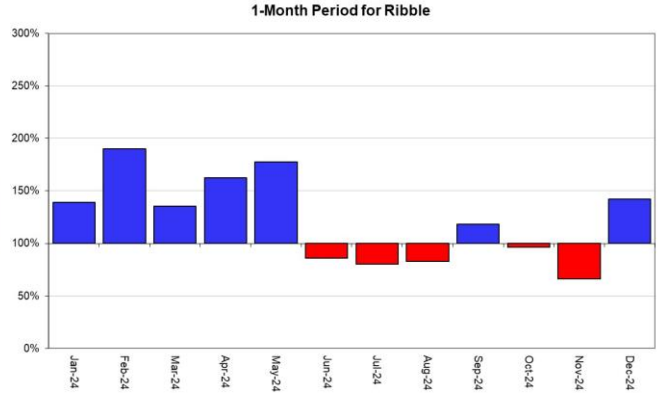

1-Month Period for Esk (Dumfries)
300%
250%
200%
150%
100%
50%
0%
Jan-24
Feb-24
Mar-24
Apr-24
May-24
Jun-24
Jul-24
Aug-24
Sep-24
Oct-24
Nov-24
Dec-24

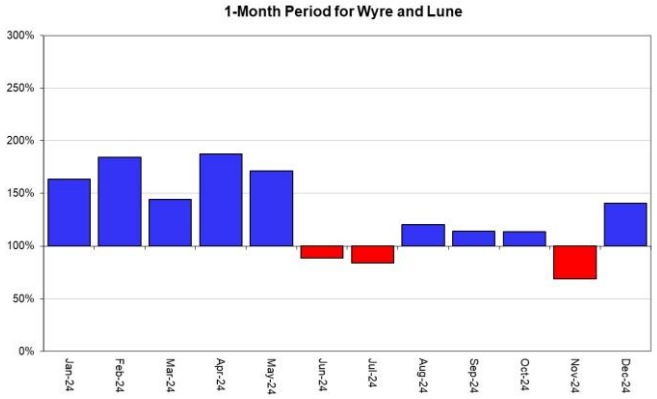

1-Month Period for Cheshire Rivers Group
300%
250%
200%
150%
100%
50%
0%
Jan-24
Feb-24
Mar-24
Apr-24
May-24
Jun-24
Jul-24
Aug-24
Sep-24
Oct-24
Nov-24
Dec-24


1-Month Period for Kent
300%
250%
200%
150%
100%
50%
0%
Jan-24
Feb-24
Mar-24
Apr-24
May-24
Jun-24
Jul-24
Aug-24
Sep-24
Oct-24
Nov-24
Dec-24


1-Month Period for Mersey and Irwell
300%
250%
200%
150%
100%
50%
0%
Jan-24
Feb-24
Mar-24
Apr-24
May-24
Jun-24
Jul-24
Aug-24
Sep-24
Oct-24
Nov-24
Dec-24


1-Month Period for Douglas
300%
250%
200%
150%
100%
50%
0%
Jan-24
Feb-24
Mar-24
Apr-24
May-24
Jun-24
Jul-24
Aug-24
Sep-24
Oct-24
Nov-24
Dec-24


1-Month Period for Ribble
300%
250%
200%
150%
100%
50%
0%
Jan-24
Feb-24
Mar-24
Apr-24
May-24
Jun-24
Jul-24
Aug-24
Sep-24
Oct-24
Nov-24
Dec-24

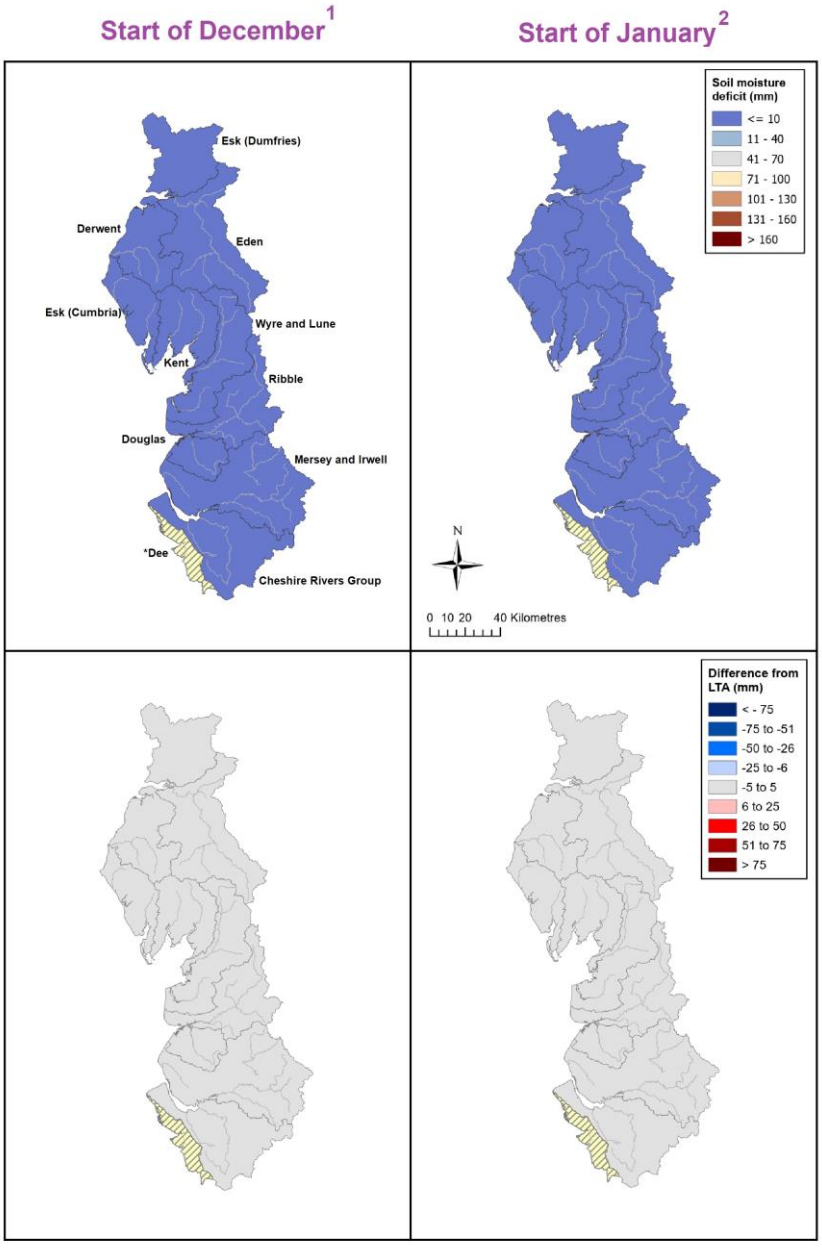


Rainfall data since 2023, extracted from Environment Agency 1km gridded rainfall dataset derived from Environment Agency intensity rain gauges. (Source: Environment Agency. Crown Copyright, 100024198, 2025). Rainfall data prior to 2023, extracted from Met Office HadUK 1km gridded rainfall dataset derived from registered rain gauges (Source: Met Office. Crown copyright, 2025).

3 Soil moisture deficit

3.1 Soil moisture deficit map

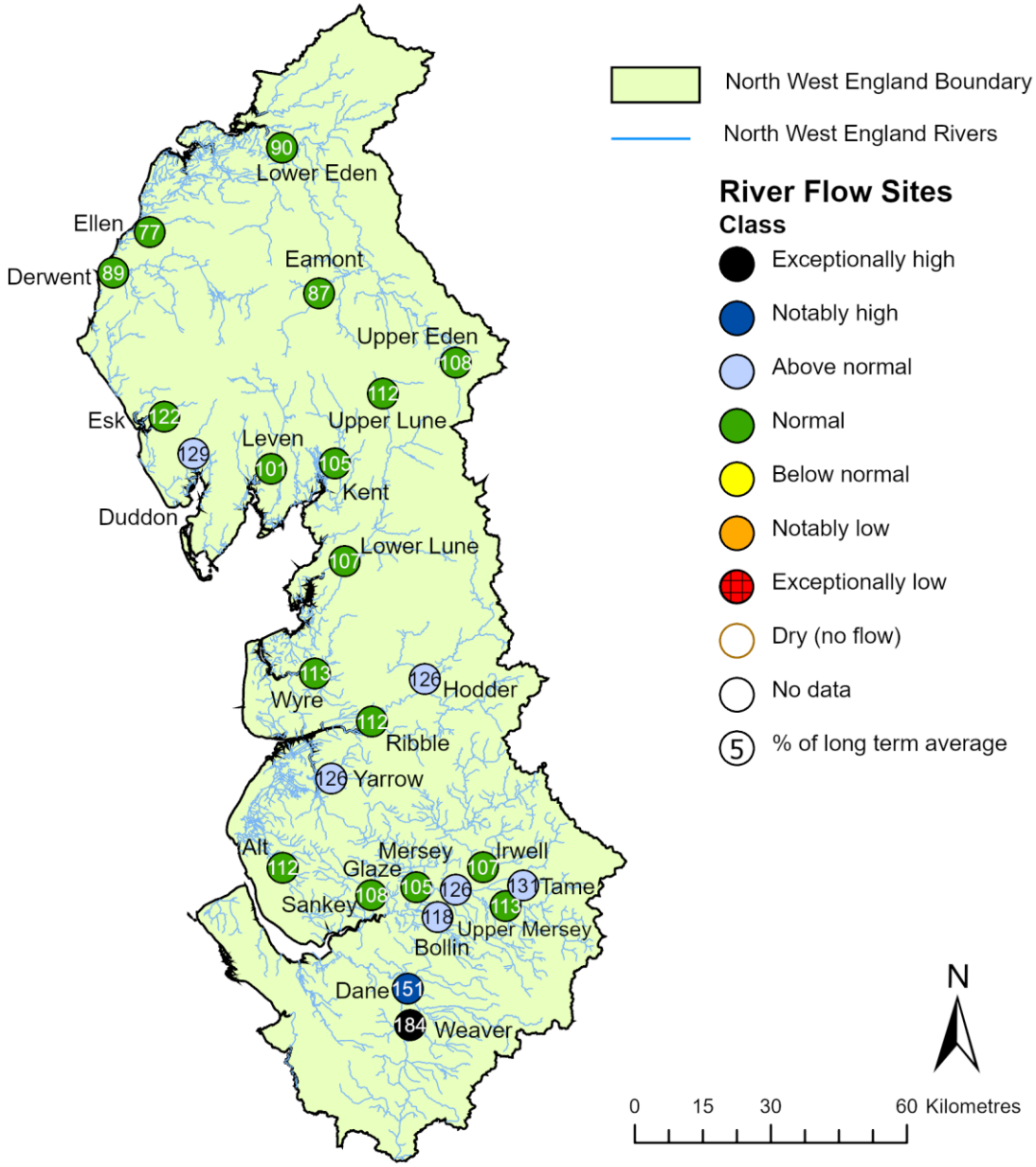
Figure 3.1: Soil moisture deficits for weeks ending 04 December 2024[1] (left panel) and 01 January 2025[2] (right panel). Top row shows actual soil moisture deficits (mm) and bottom row shows the difference (mm) of the actual from the 1961-90 long term average soil moisture deficits. MORECS data for real land use.



4 River flows

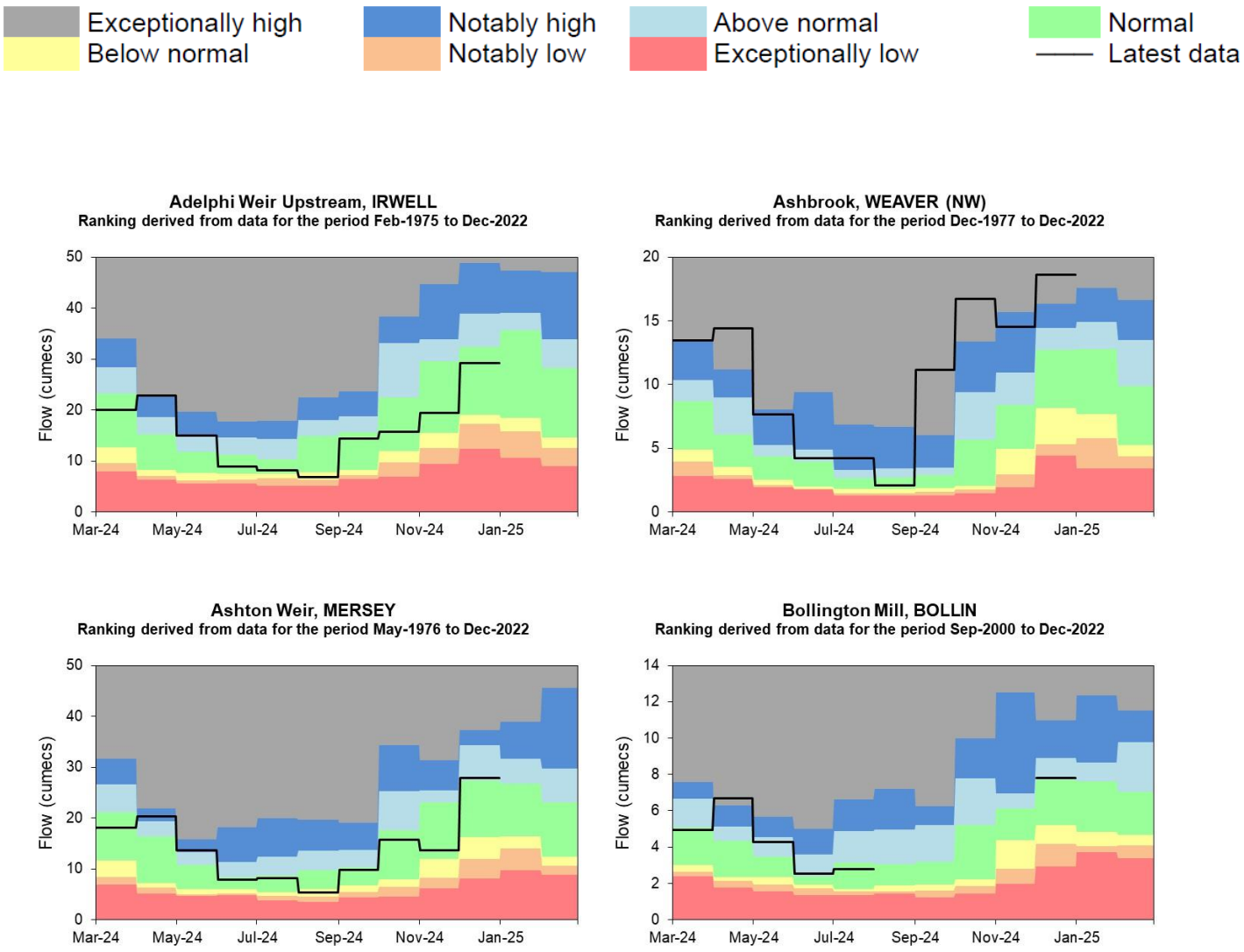
4.1 River flows map

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

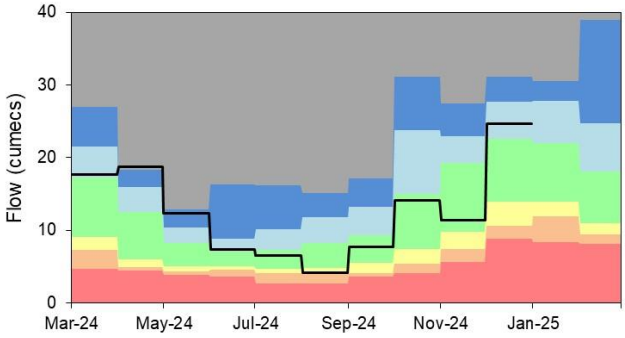


4.2 River flow charts

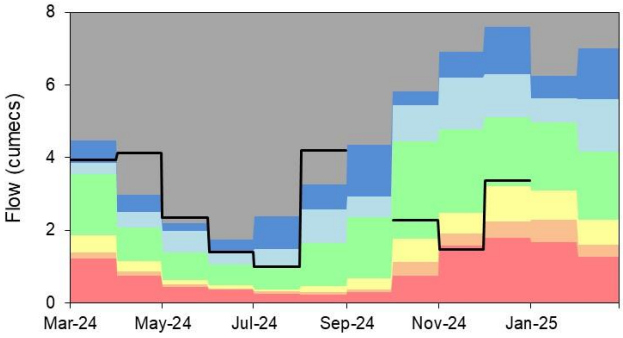
Figure 4.2: Monthly mean river flow for index sites over the past year, compared to an analysis of historic monthly mean flows.



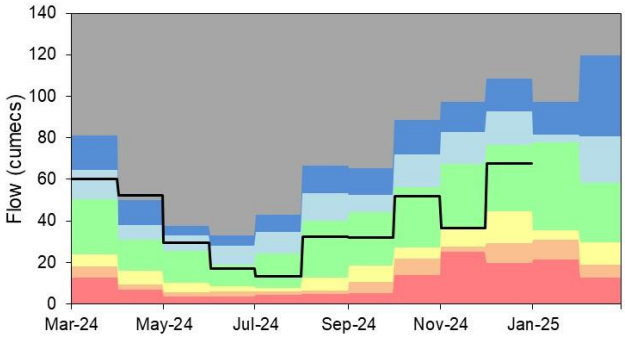
Brinksway, MERSEY
Ranking derived from data for the period Jan-1974 to Dec-2022



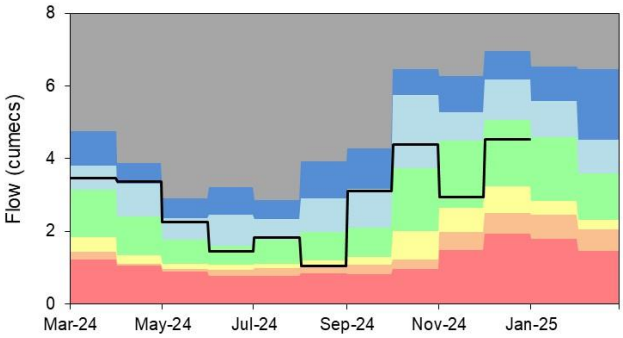
Bullgill, ELLEN
Ranking derived from data for the period Jan-1976 to Dec-2022



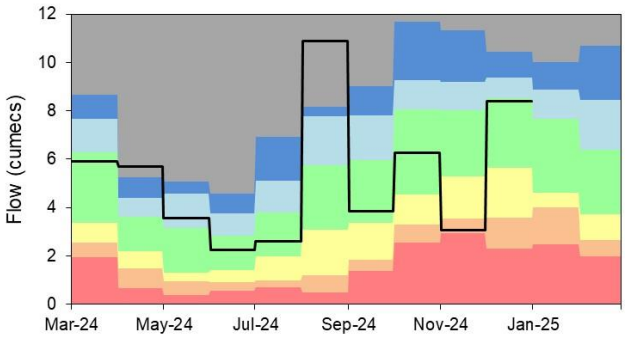
Caton, LUNE
Ranking derived from data for the period Jan-1959 to Dec-2022



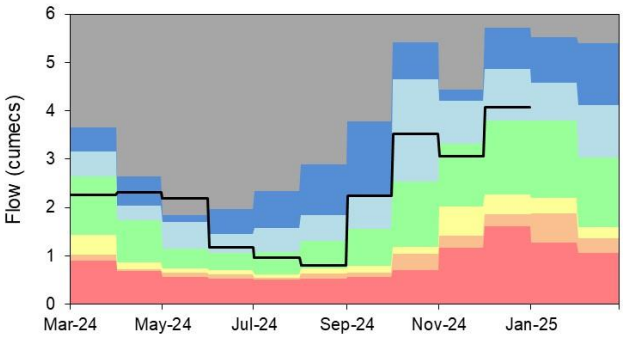
Causey Bridges, SANKEY
Ranking derived from data for the period Jan-1977 to Dec-2022



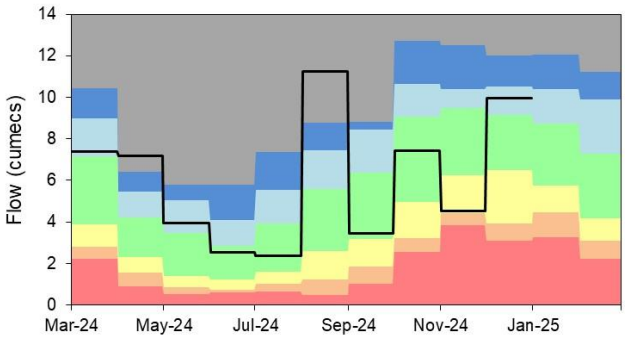
Cropple How, ESK (NW)
Ranking derived from data for the period Jan-1976 to Dec-2022



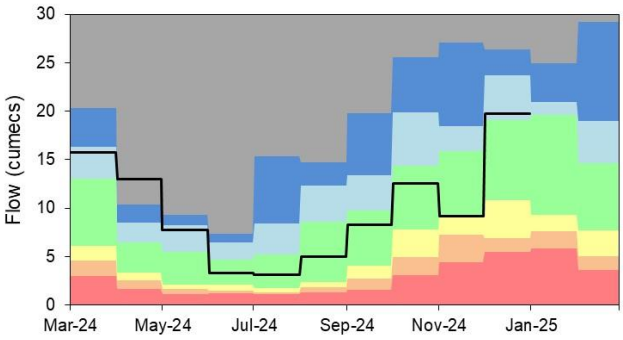
Croston, YARROW
Ranking derived from data for the period Jan-1976 to Dec-2022



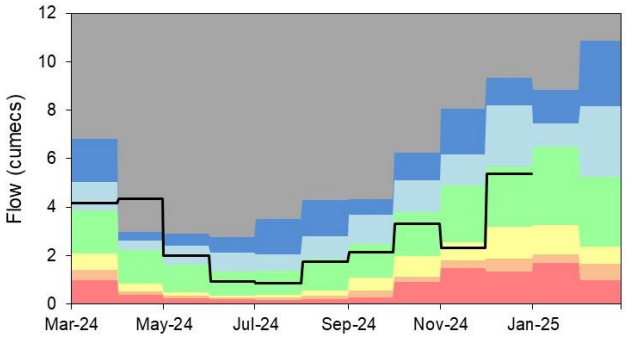
Duddon Hall, DUDDON
Ranking derived from data for the period Mar-1968 to Dec-2022



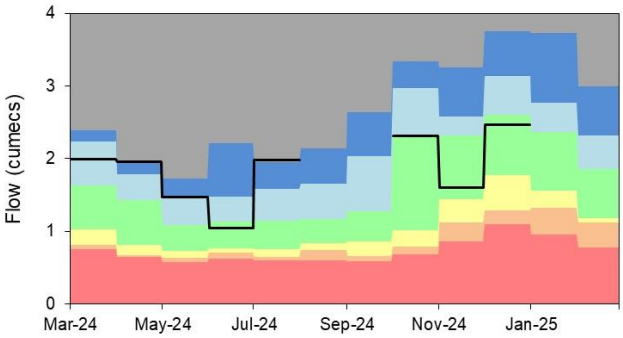
Hodder Place, HODDER
Ranking derived from data for the period Jan-1976 to Dec-2022



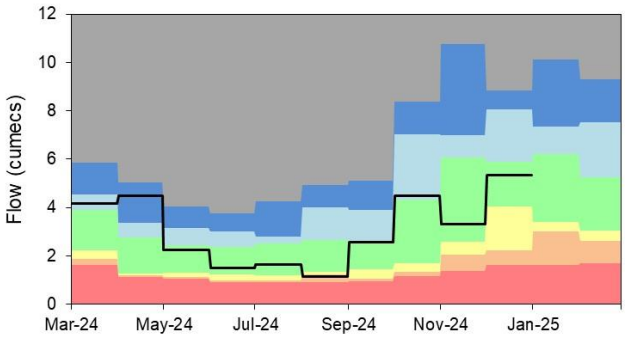
Kirkby Stephen, EDEN (NW)
Ranking derived from data for the period Oct-1971 to Dec-2022



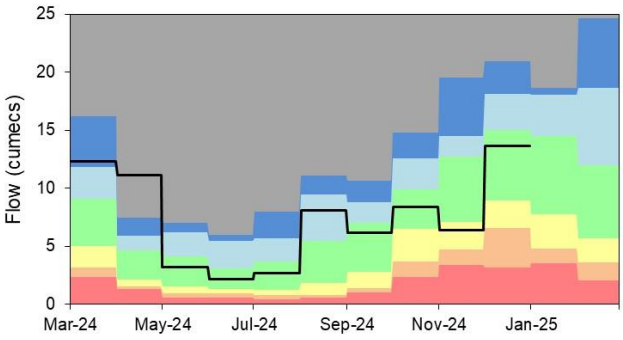
Kirkby, ALT
Ranking derived from data for the period Oct-1977 to Dec-2022



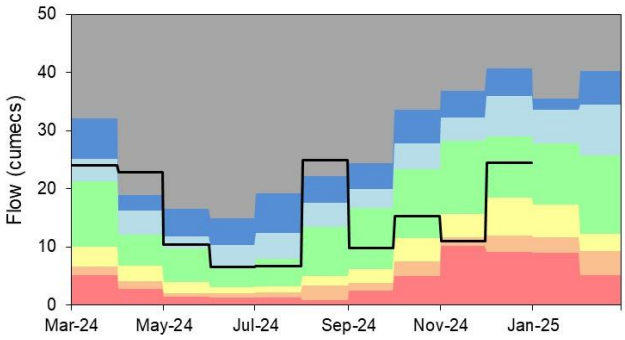
Little Woolden Hall Ultrasonic, GLAZE
Ranking derived from data for the period Jul-1995 to Dec-2022



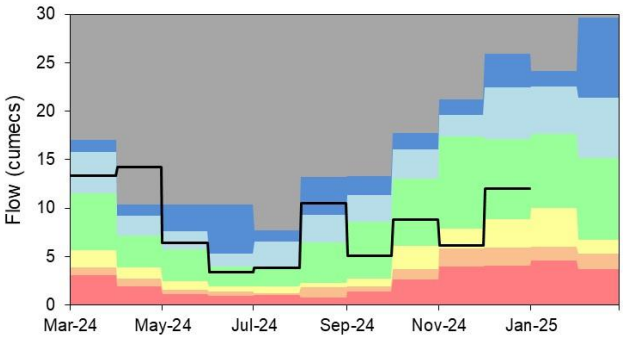
Lunes Bridge, LUNE
Ranking derived from data for the period Dec-1979 to Dec-2022



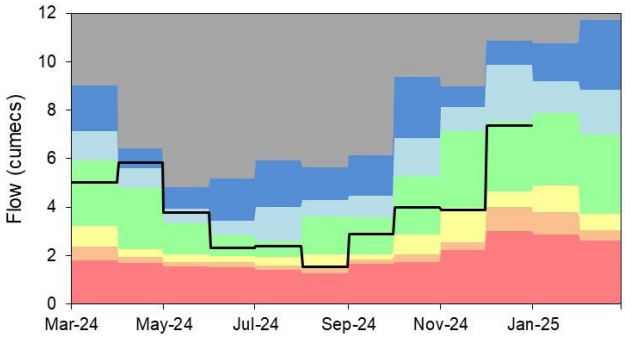
Newby Bridge FMS, LEVEN (NW)
Ranking derived from data for the period Jan-1972 to Dec-2022



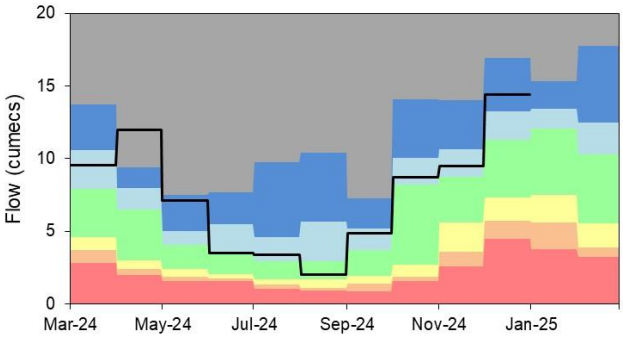
Pooley Bridge, EAMONT
Ranking derived from data for the period Jul-1970 to Dec-2022



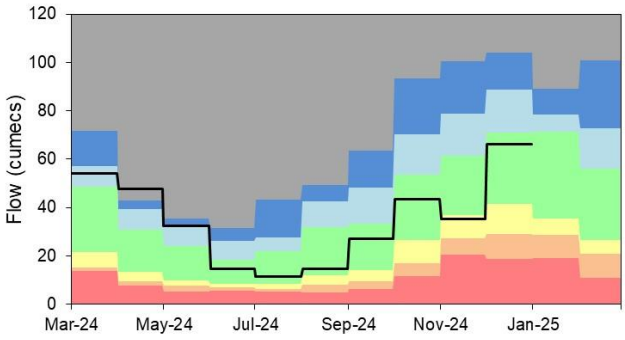
Portwood, TAME
Ranking derived from data for the period Jan-1976 to Dec-2022



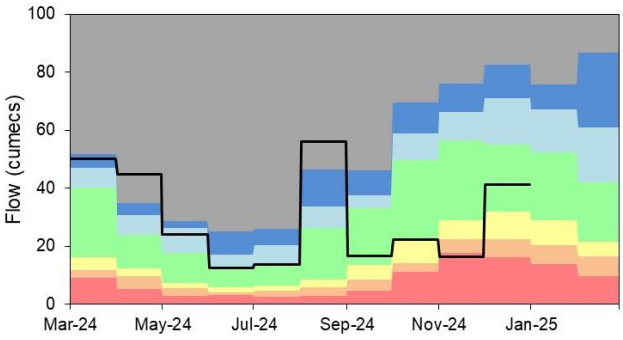
Rudheath, DANE
Ranking derived from data for the period Jan-1976 to Dec-2022

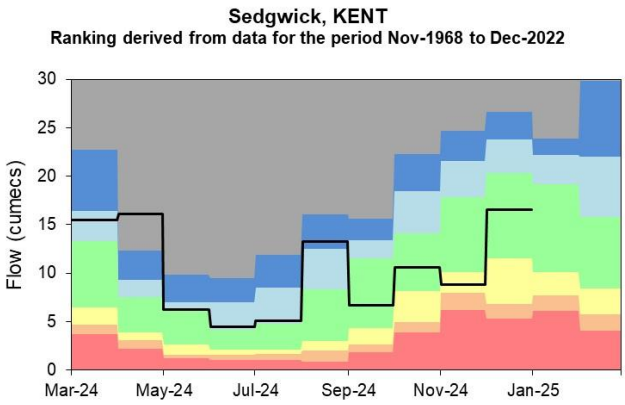


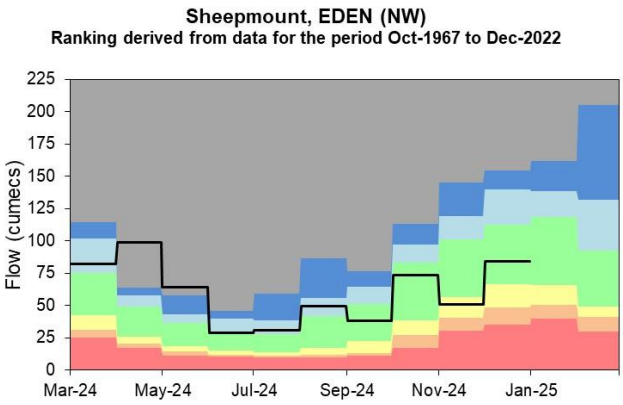
Samlesbury Pgs, RIBBLE (NW)
Ranking derived from data for the period May-1960 to Dec-2022

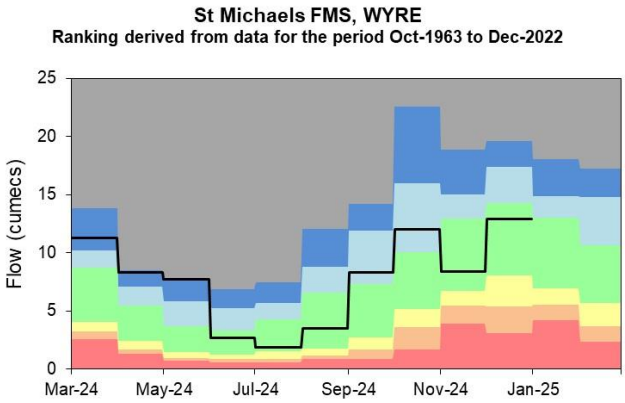


Seaton Mill, DERWENT (NW)
Ranking derived from data for the period Sep-1960 to Dec-2022







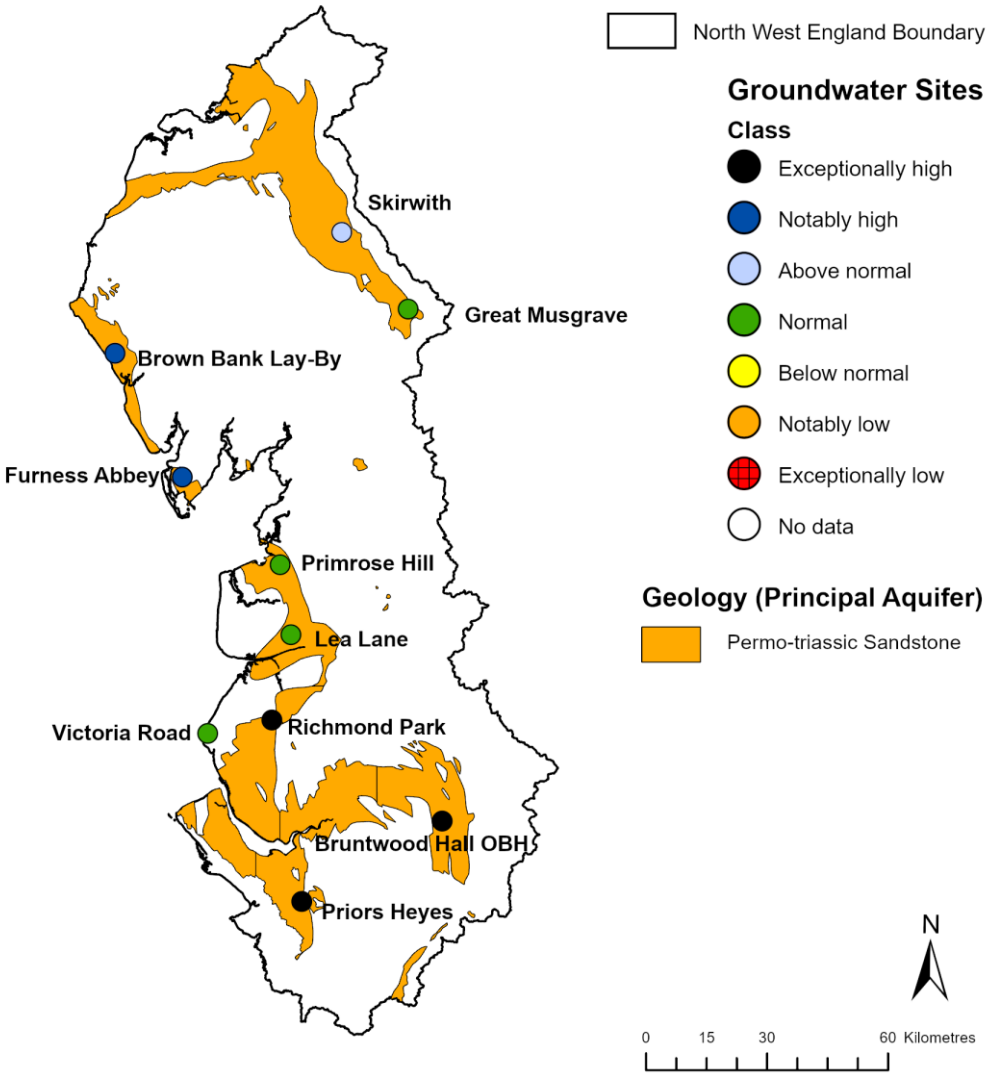


Source: Environment Agency, 2025.

5 Groundwater levels

5.1 Groundwater levels map

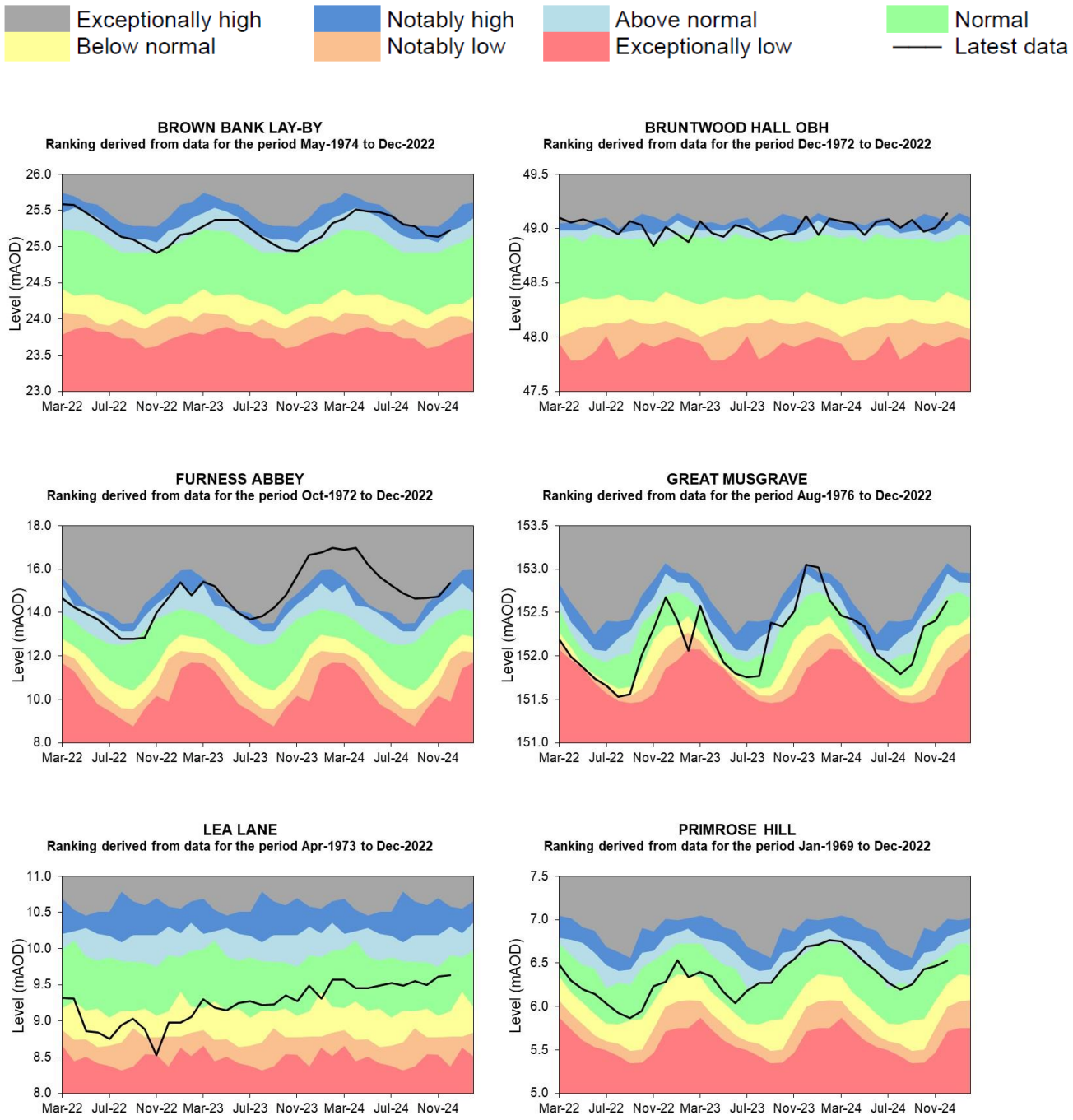
Figure 5.1: Groundwater levels for indicator sites at the end of December 2024, classed relative to an analysis of respective historic December levels. Table available in the appendices with detailed information. Please note Victoria Road Borehole sits within a superficial deposit as opposed to a bedrock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

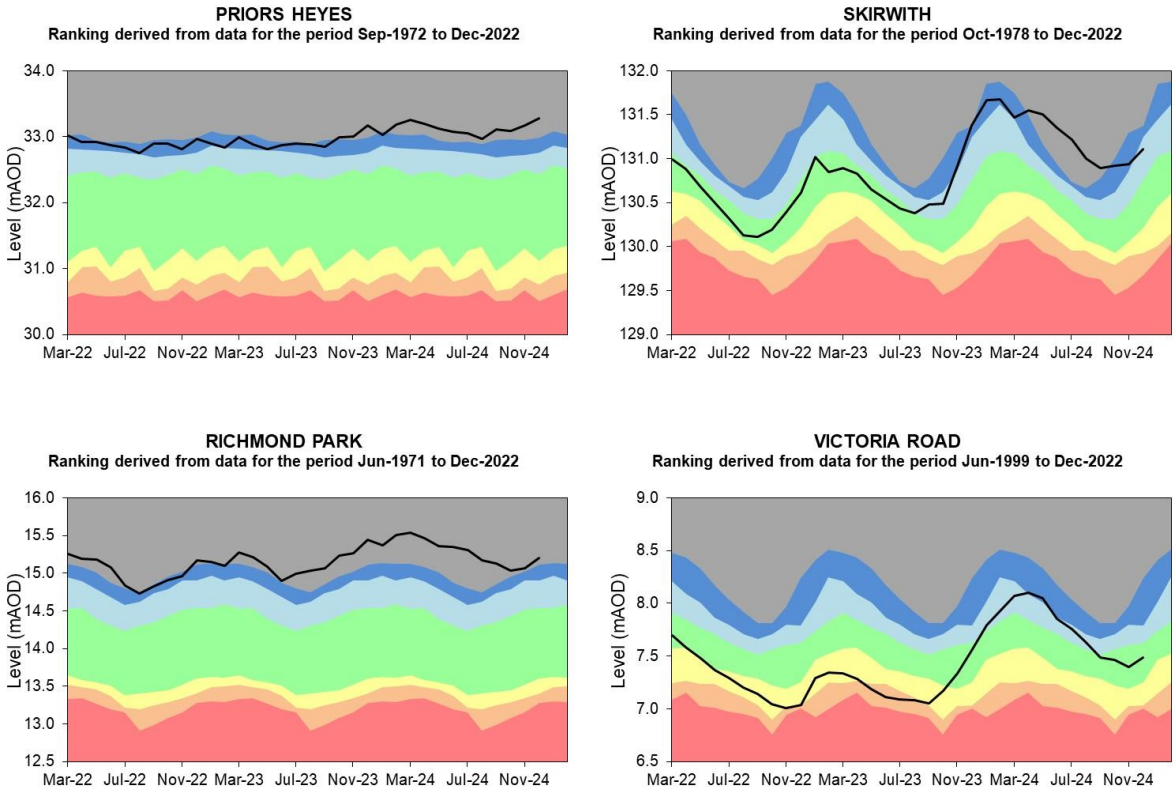


(Source: Environment Agency). Geological map reproduced with kind permission from UK Groundwater Forum, BGS copyright NERC. Crown copyright. All rights reserved. Environment Agency, 100024198, 2025.

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, 2025.

6 Reservoir storage

Figure 6.1: The location of reservoirs that comprise the supply districts across North-west England and selected individual reservoirs.

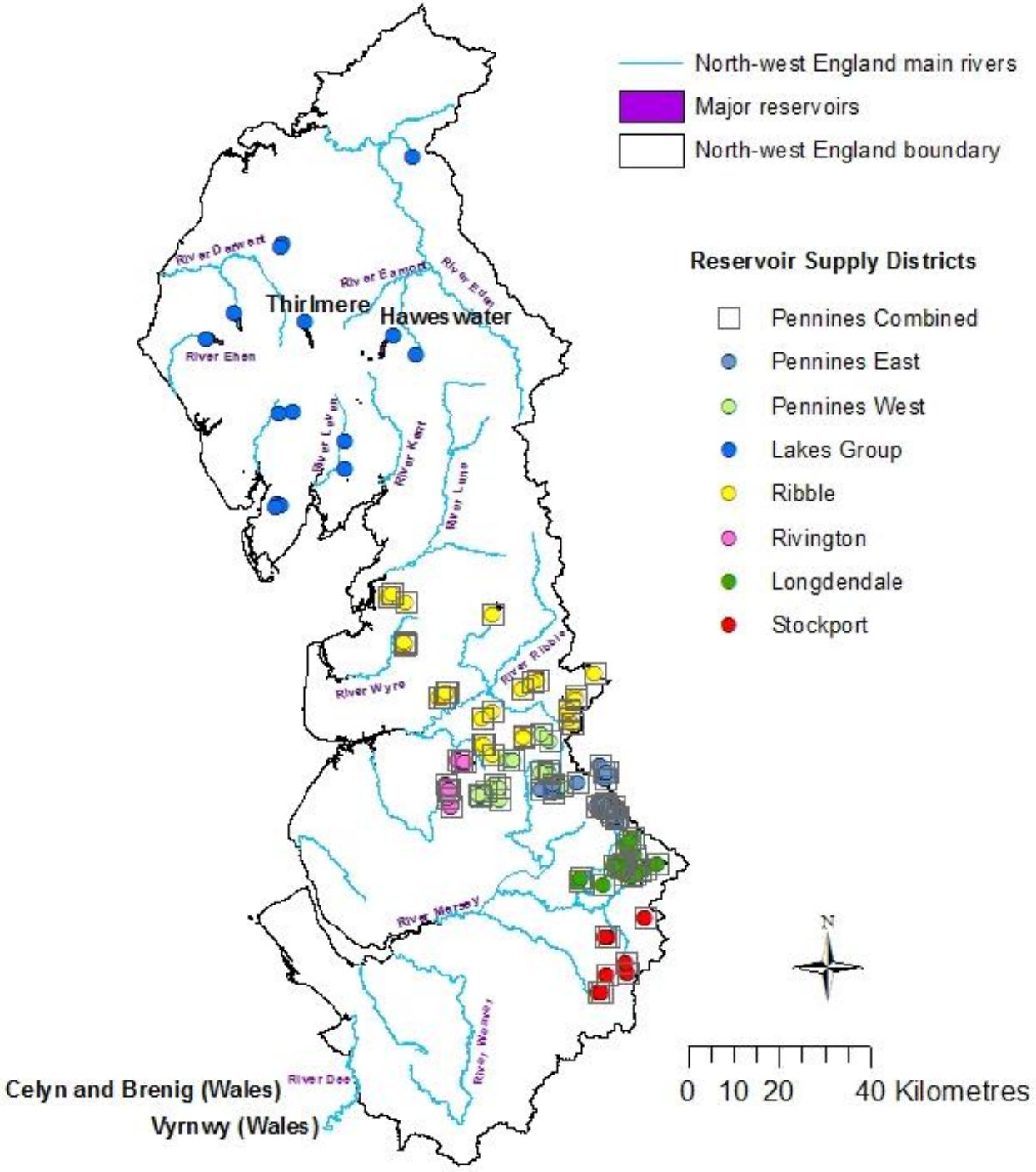
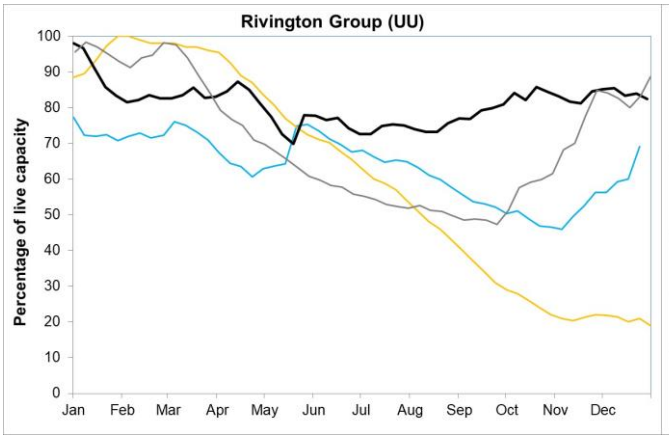
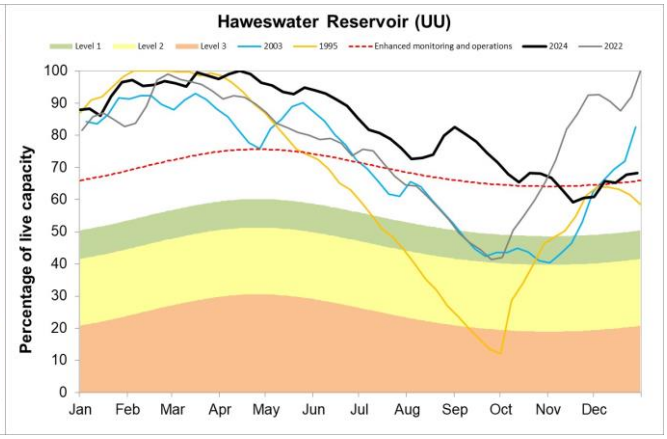
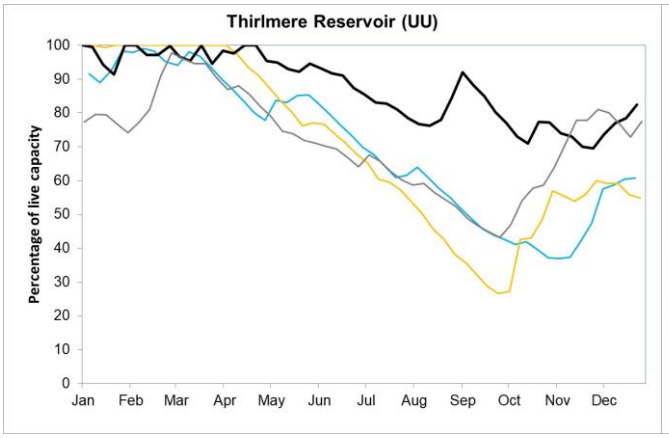
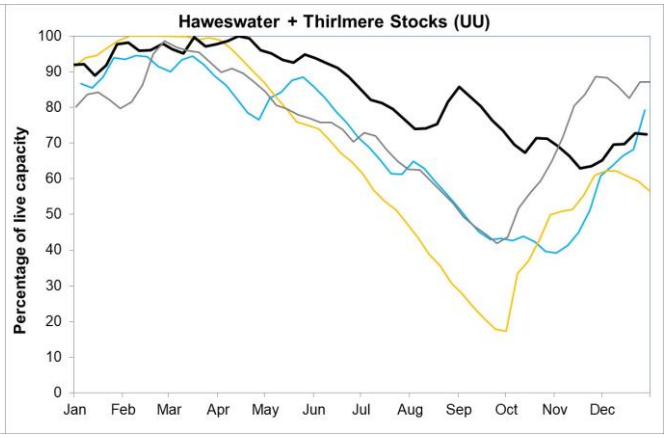


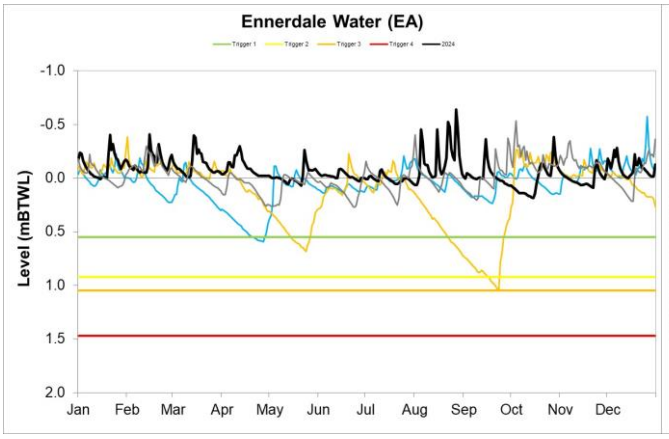
Figure 6.2: End of month reservoir storage for supply districts across North-west England and selected individual reservoirs for 2024 and representative years: 1995, 2003 and 2022. Note: Historic records of individual reservoirs and reservoir groups making up the regional values vary in length.

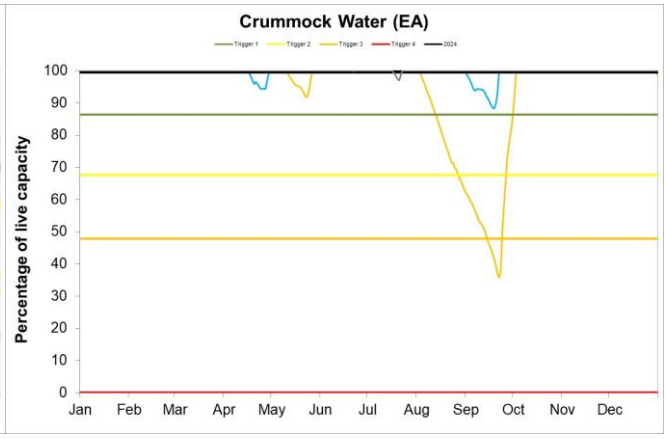

Rivington Group (UU)
Percentage of live capacity
100
90
80
70
60
50
40
30
20
10
0
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

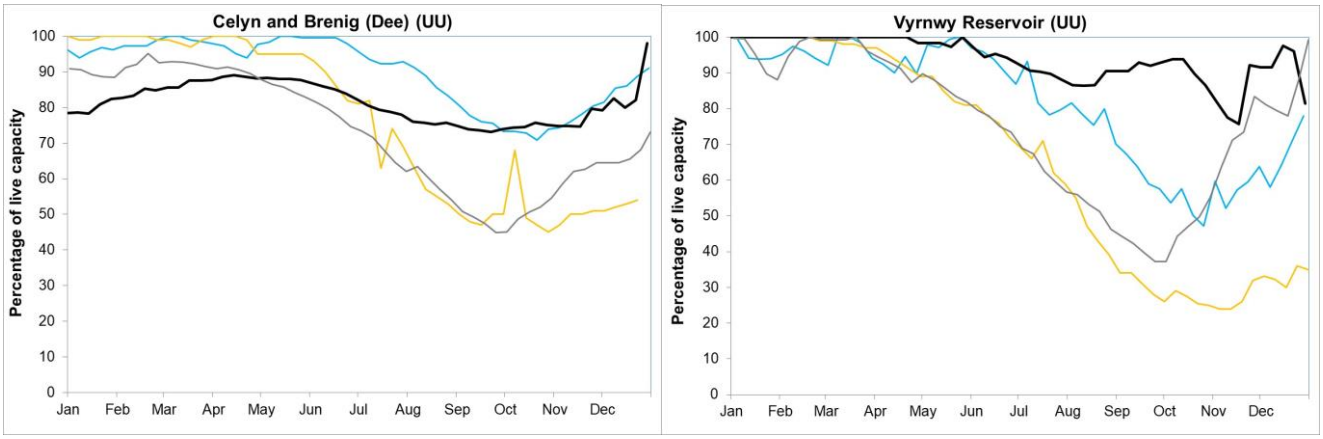

Haweswater Reservoir (UU)
Level 1
Level 2
Level 3
2003
1995
Enhanced monitoring and operations
2024
2022
Percentage of live capacity
100
90
80
70
60
50
40
30
20
10
0
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec


Thirlmere Reservoir (UU)
Percentage of live capacity
100
90
80
70
60
50
40
30
20
10
0
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec


Haweswater + Thirlmere Stocks (UU)
Percentage of live capacity
100
90
80
70
60
50
40
30
20
10
0
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec


Ennerdale Water (EA)
Trigger 1
Trigger 2
Trigger 3
Trigger 4
2024
Level (mBTWL)
-1.0
-0.5
0.0
0.5
1.0
1.5
2.0
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec


Crummock Water (EA)
Trigger 1
Trigger 2
Trigger 3
Trigger 4
2024
Percentage of live capacity
100
90
80
70
60
50
40
30
20
10
0
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec



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	Dec 2024 rainfall % of long term average 1961 to 1990	Dec 2024 band	Oct 2024 to December cumulative band	Jul 2024 to December cumulative band	Jan 2024 to December cumulative band
Cheshire Rivers Group	164	Notably High	Notably high	Exceptionally high	Exceptionally high
Derwent (North West)	127	Above Normal	Normal	Normal	Notably high
Douglas	153	Notably High	Above normal	Above normal	Exceptionally high
Eden	118	Normal	Normal	Normal	Notably high
Esk (Cumbria)	131	Above Normal	Normal	Above normal	Exceptionally high
Esk (Dumfries)	117	Normal	Normal	Normal	Notably high
Kent	137	Above Normal	Normal	Above normal	Exceptionally high
Mersey And Irwell	163	Notably High	Normal	Normal	Notably high
Ribble	142	Above Normal	Normal	Normal	Notably high
Wyre And Lune	141	Above Normal	Normal	Normal	Notably high

North West	139	Above Normal	Normal	Normal	Notably high

8.2 River flows table

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

Little Woolden Hall Ultrasonic	Glaze	Glaze	Normal	Normal
Lunes Bridge	Lune	Lune Upper	Normal	Below normal
Newby Bridge FMS	Leven (North West)	Leven Cumb	Normal	Notably low
Pooley Bridge	Eamont	Eamont	Normal	Below normal
Portwood	Tame	Tame	Normal	Below normal
Rudheath	Dane	Dane	Notably high	Above normal
Samlesbury PGS	Ribble (North West)	Ribble Lower	Normal	Below normal
Seaton Mill	Derwent (North West)	Derwent Cumb Lower	Normal	Exceptionally low
Sedgwick	Kent	Levens Bridge	Normal	Below normal
Sheepmount	Eden (North West)	Eden Cumb Lower	Normal	Below normal
St Michaels FMS	Wyre	Brock	Normal	Normal

8.3 Groundwater table

Site name	Aquifer	End of Dec 2024 band	End of Nov 2024 band
Brown Bank Lay-by	West Cumbria Permo-triassic Sandstone	Notably high	Notably high
Bruntwood Hall Obh	East Cheshire Permo-triassic Sandstone	Exceptionally high	Notably high
Furness Abbey	Furness Permo-triassic Sandstone	Notably high	Notably 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	Above normal	Notably high
Victoria Road Entrance	West Lancashire Quarternary Sand And Gravel Superficial Deposits	Normal	Normal