

Monthly water situation report: Yorkshire Area

1 Summary - October 2024

A month of average rainfall, becoming dry and settled in the final week. Most river flows were in the normal or above normal range. Soils remained saturated in the uplands and became wetter elsewhere. Groundwater levels were normal or higher for the time of year. Reservoir stocks increased to above the long term average (LTA) for October.

1.1 Rainfall

The rainfall for October was within normal range; Yorkshire's catchments received between 82% and 110% of the LTA based on the Met Office Had-UK Grid data set. The Don catchment received the most rainfall relative to normal conditions, representing 110% of the LTA. Frequent spells of rain occurred throughout the first 3 weeks and conditions were more settled during the final week. A total of 3 short wet periods occurred on day 8, 16 and 27. On day 8, the heaviest rain occurred in the Don catchment and on day 16 and 27 in the upper reaches of the Aire and Ure, but none of these exceeded 55% of the monthly LTA. Additionally in the east of the Area, the Rye, Derwent and Hull were wet on the first day of the month.

1.2 Soil moisture deficit

There was a notable change in soil moisture following on from September, with most catchments becoming gradually wetter during October. At the start of October, the soils in central and eastern catchments were within normal range and only those in the lower catchments of the Don, Aire and Ouse were classified as dry. By the second week soils in central Yorkshire were classed as wet and the rain that fell ensured these remained wet for the remainder of the month. At month end, many of the soils across Yorkshire were classified as wet, with conditions close to saturation in the western Pennines, North York Moors and upper Don. Only soils in the lower Calder, lower Aire, lower Don, Eastern Hull and Holderness were in the normal range.

1.3 River flows

Monthly mean flows were between 80% and 195% of the LTA. Most catchments were reporting within normal range for October. The Esk, Derwent, Swale, Rother and West Beck were classified as above normal. Monthly mean flow in the Don was notably high due to peak flows at the start of the month generated by heavy rain that fell on 30 September.

At the start of the month flows across Yorkshire were in an elevated state with all reported rivers classified as above normal and as exceptionally high in the Nidd, Rother, Esk and Rye. Widespread rain events were reflected in flows peaking to exceptionally high on days 9 and

10, particularly in central and eastern parts of Yorkshire. Rivers in the Pennine catchments peaked on day 16 and 17.

Most of the Pennine rivers receded into the normal flow range for the time of year between rainfall episodes. In contrast, daily mean flows in the Don and Rother and the Derwent remained above normal throughout the first three weeks. Later in the month, flows receded across Yorkshire. By week 4, on day 24, all rivers apart from West Beck in the Hull catchment had returned within normal state and remained stable until month end.

Baseflow in the West Beck at Wansford Snakeholm increased throughout the month, mirroring the rise in the northern Chalk groundwater level. Daily mean flows were above normal for most of the month.

1.4 Groundwater levels

Magnesian Limestone

The groundwater level within the Magnesian Limestone at Brick House Farm remains the same at exceptionally high for the time of year.

Millstone Grit

The groundwater level increased within the Millstone Grit at Hill Top Farm , rising to normal for the time year. It should be noted that this observation borehole is used for water abstraction by means of a pump. Therefore, the groundwater level recorded here may be subject to the effects of this.

Sherwood Sandstone

The change in groundwater level in the Sherwood Sandstone varied with location. The monitoring well at Great Ouseburn remained at exceptionally high for the time of year with a slight decrease. The level at Riccall Approach Farm remained normal for the time of year with a slight increase.

Corallian Limestone

The groundwater level increased slightly within the Corallian Limestone at Sproxton and was in the normal range for the time of year.

Chalk

The groundwater level increased to above normal at Wetwang (northern Yorkshire Wolds chalk). While Dalton Estate level (central Yorkshire Wolds chalk) decreased and remained normal for the time of year.

1.5 Reservoir stocks

Reservoir stocks increased throughout the first 3 weeks of October with a slight decrease in the final week. Total reservoir stocks increased by about 13% of total capacity during the month, with the largest weekly increase occurring between 2 and 9 October. At month-end the overall stocks were 5.5% above the LTA.

1.6 Environmental Impact

During October up to six abstractors were restricted by Hands-off Flows. Affected catchments were in central and East Yorkshire.

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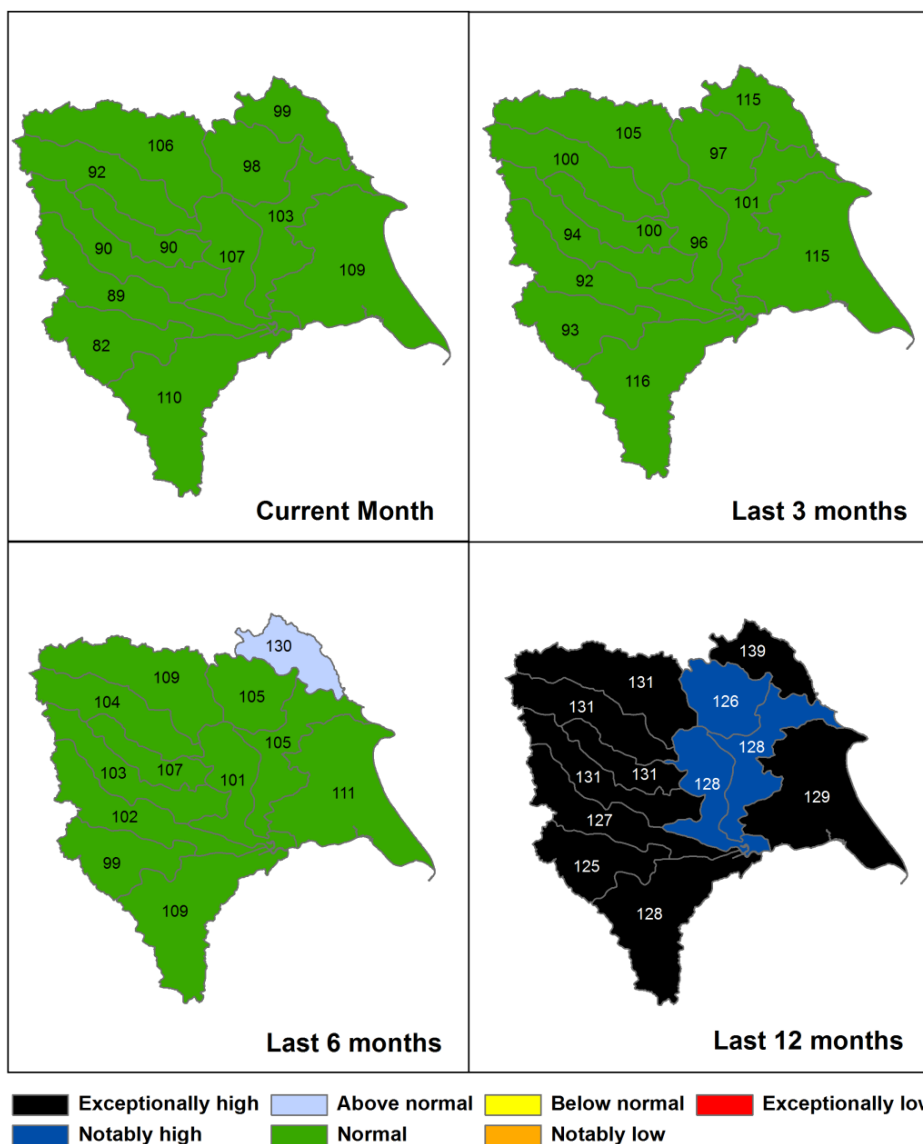
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Contact Details: 020 84748174

2 Rainfall

2.1 Rainfall map

Figure 2.1: Total rainfall for hydrological areas for the current month (up to 31 October 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.

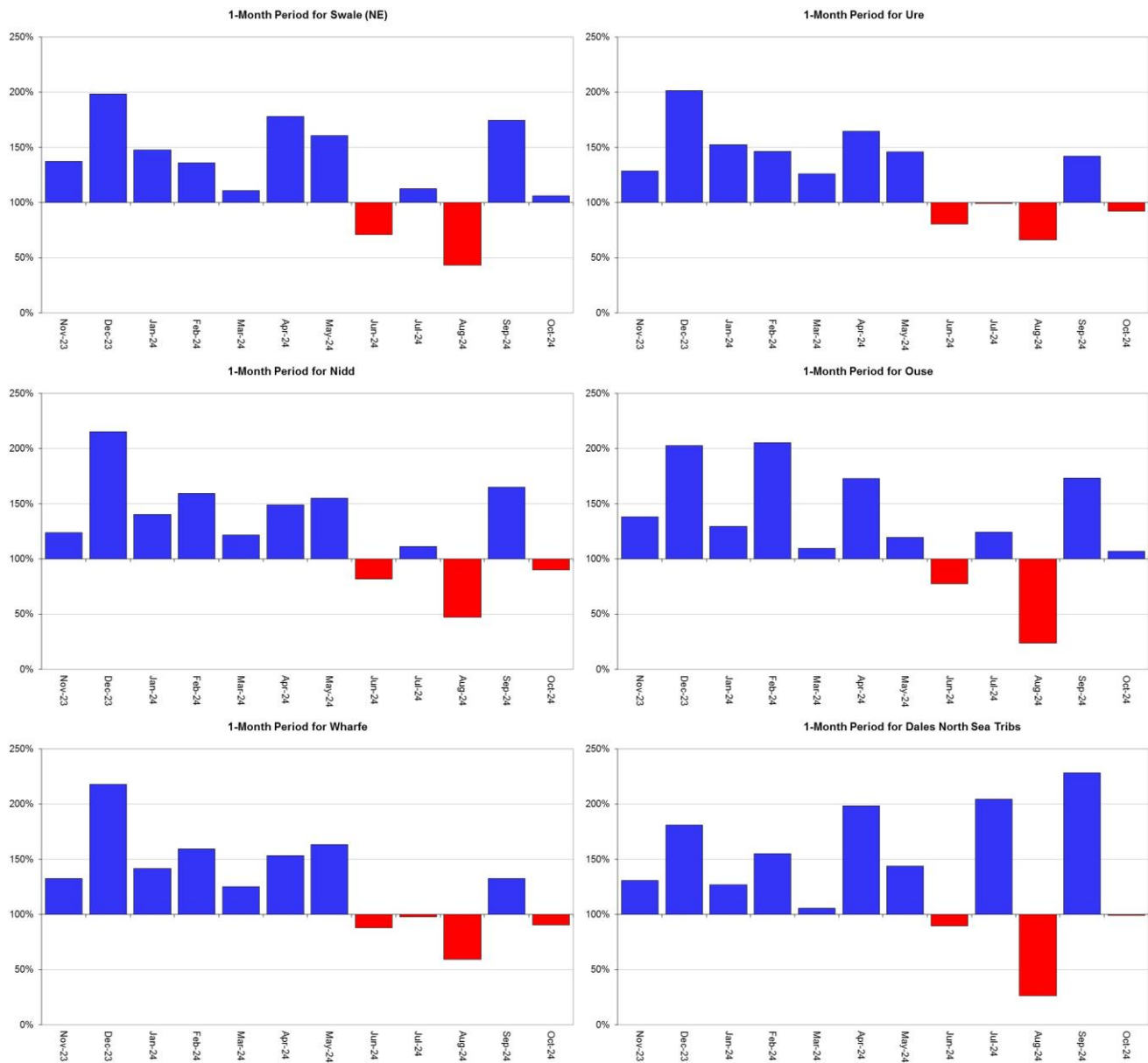


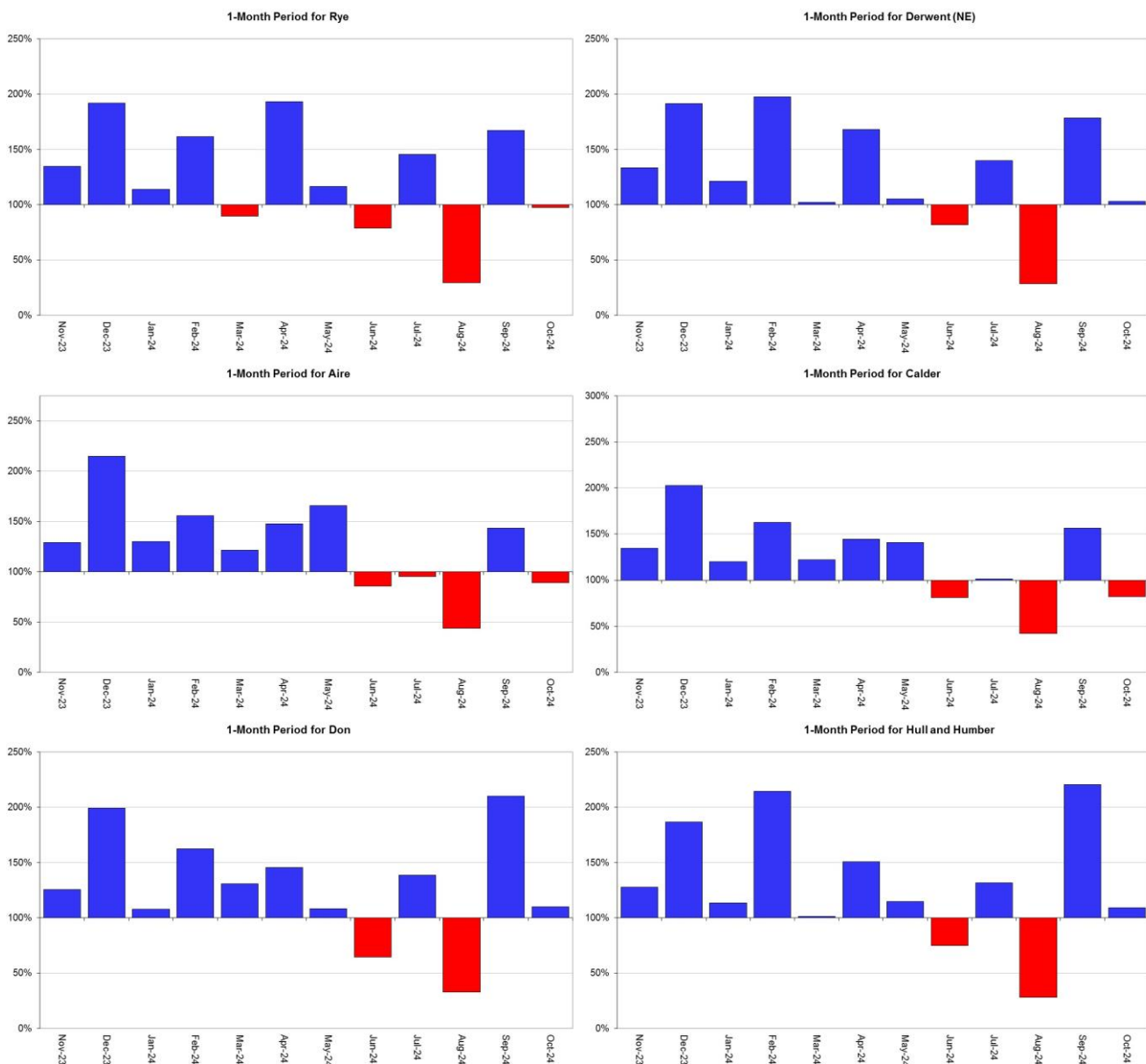
HadUK data based on the Met Office 1km gridded rainfall dataset derived from rain gauges (Source: Met Office. Crown copyright, 2024). Provisional data based on Environment Agency

1km gridded rainfall dataset derived from Environment Agency intensity rain gauges. Crown copyright. All rights reserved. Environment Agency, 100024198, 2024.

2.2 Rainfall charts

Figure 2.2: Monthly rainfall totals for the past 12 months as a percentage of the 1961 to 1990 long term average for each region and for England.



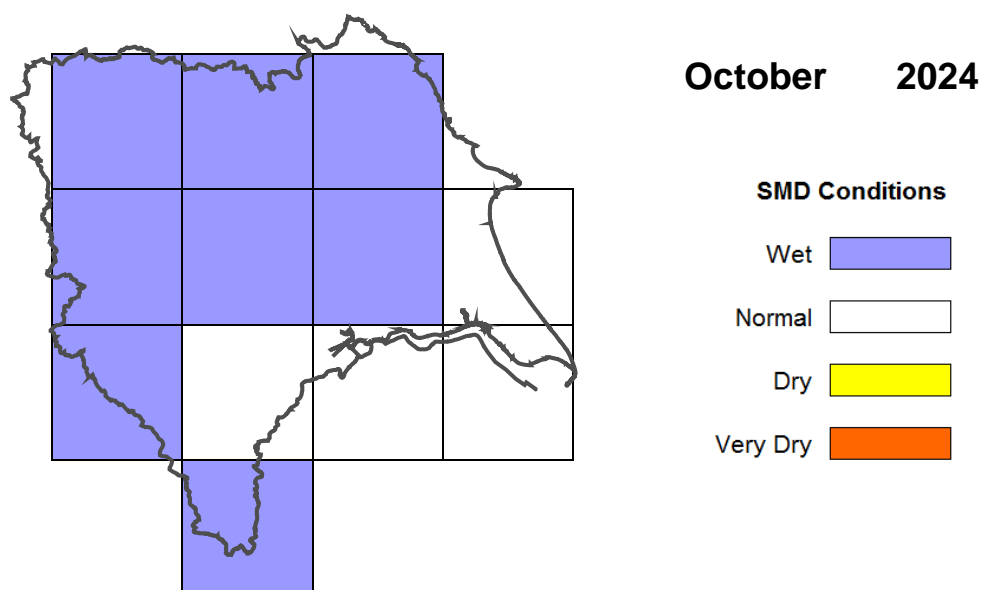


Rainfall data for 2023 and 2024, extracted from Environment Agency 1km gridded rainfall dataset derived from Environment Agency intensity rain gauges. (Source: Environment Agency. Crown Copyright, 100024198, 2024). Rainfall data prior to 2023, extracted from Met Office HadUK 1km gridded rainfall dataset 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 31 October 2024. Shows the difference (mm) of the actual soil moisture deficit from the 1961 to 1990 long term average soil moisture deficits. MORECS data for real land use.



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

4 River flows

4.1 River flows map

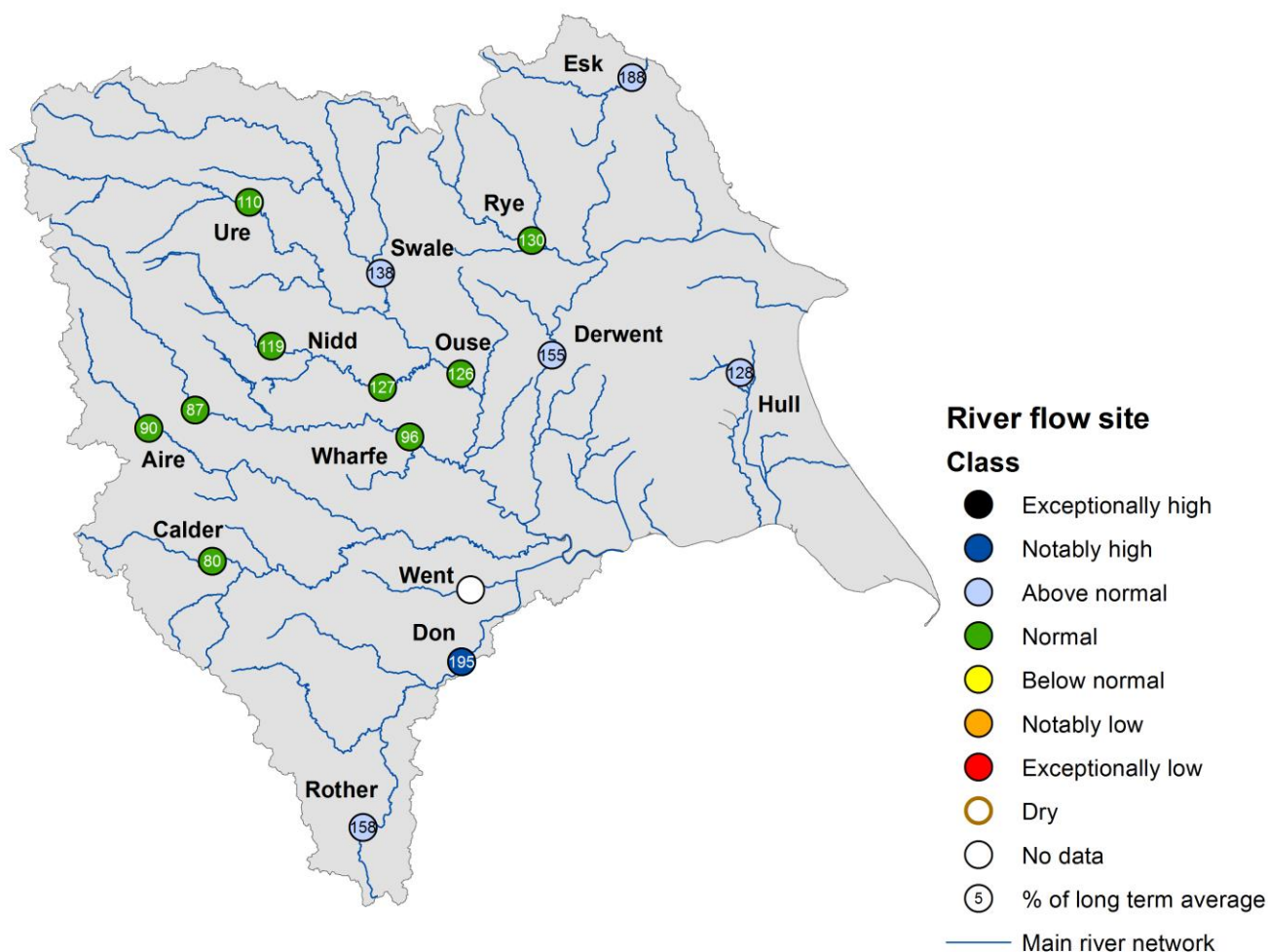
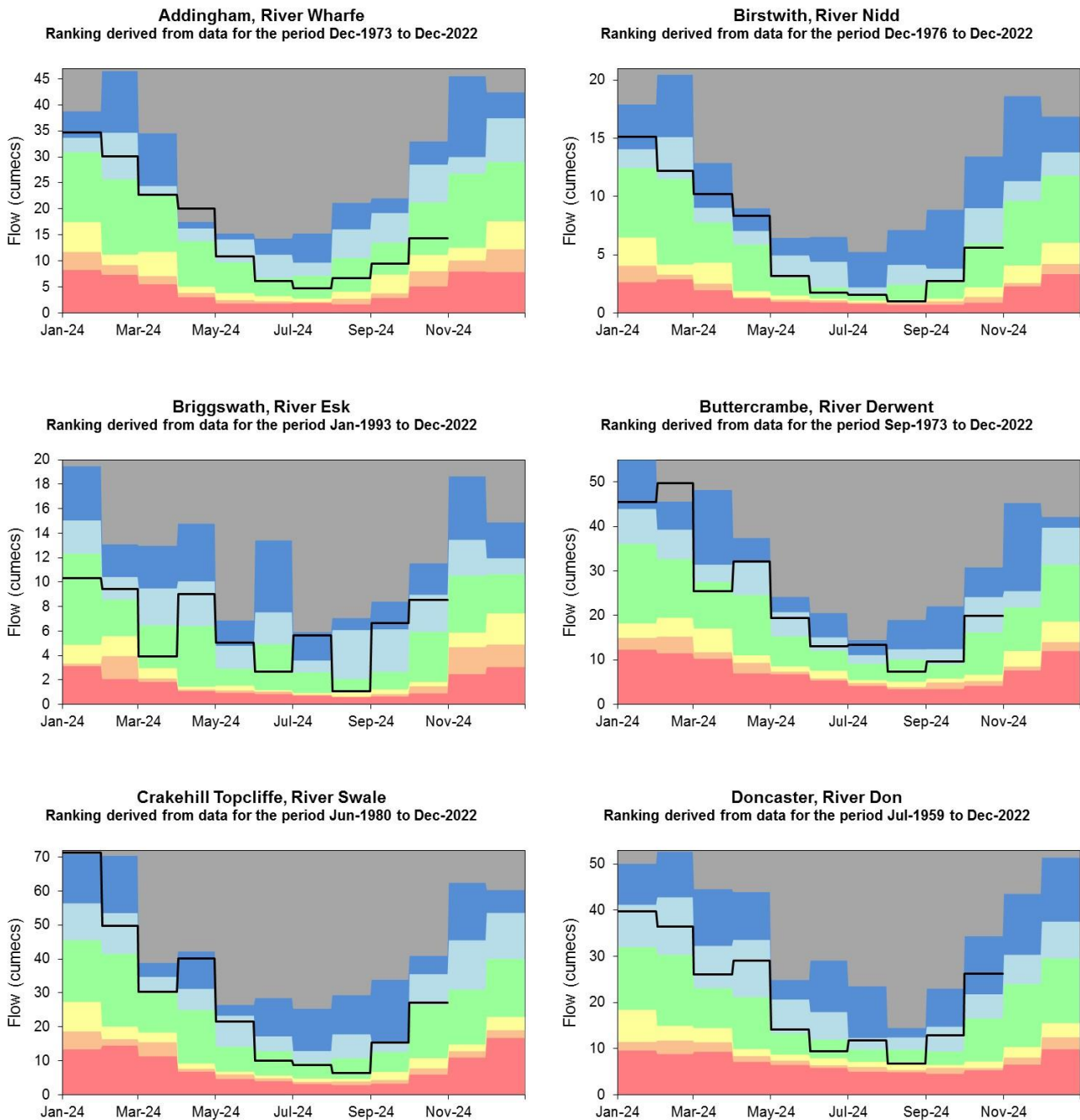


Figure 4.1: Monthly mean river flow for indicator sites for October 2024, expressed as a percentage of the respective long term average and classed relative to an analysis of historic October monthly means. Table available in the appendices with detailed information.

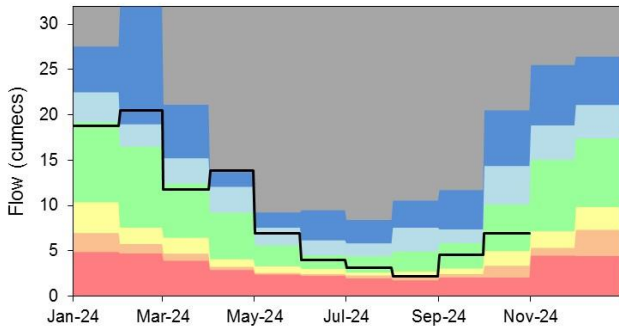
(Source: Environment Agency). Crown copyright. All rights reserved. Environment Agency, 100024198, 2024.

4.2 River flow charts

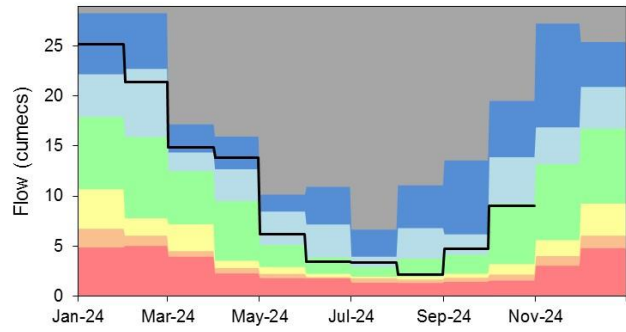
Figure 4.2: Daily mean river flow for index sites over the past year, compared to an analysis of historic daily mean flows.



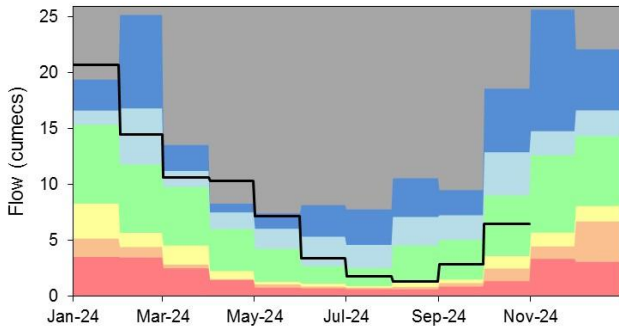
Elland, River Calder
Ranking derived from data for the period Jul-1971 to Dec-2022



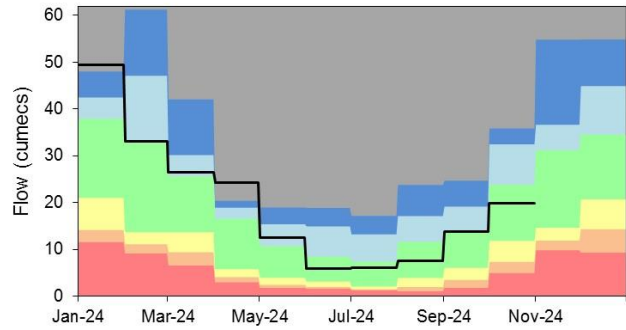
Hunsingore, River Nidd
Ranking derived from data for the period Oct-1968 to Dec-2022



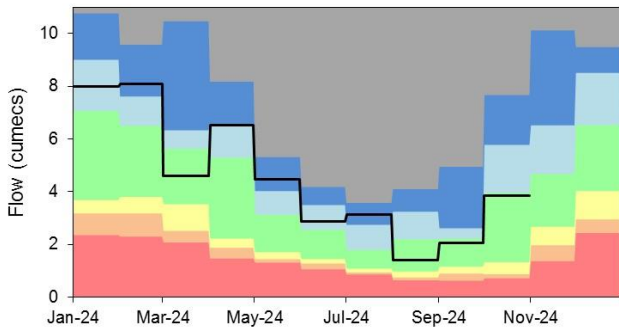
Kildwick, River Aire
Ranking derived from data for the period Aug-1971 to Dec-2022



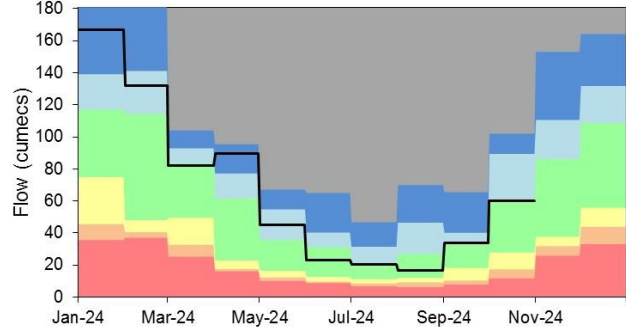
Kilgram Bridge, River Ure
Ranking derived from data for the period Aug-1971 to Dec-2022



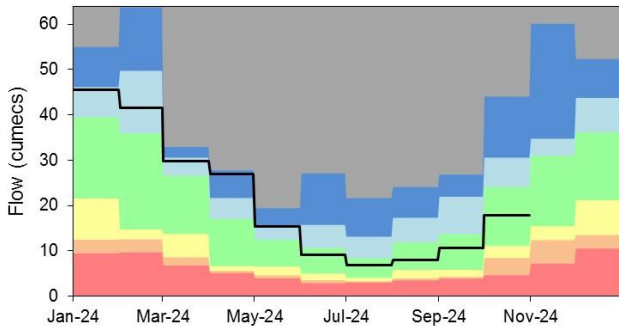
Ness, River Rye
Ranking derived from data for the period Sep-1974 to Dec-2022



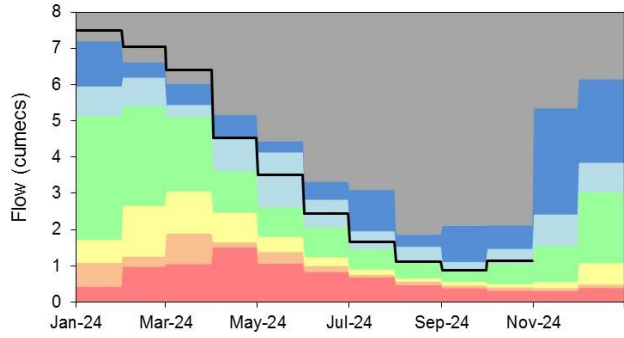
Skelton, River Ouse
Ranking derived from data for the period Sep-1969 to Dec-2022



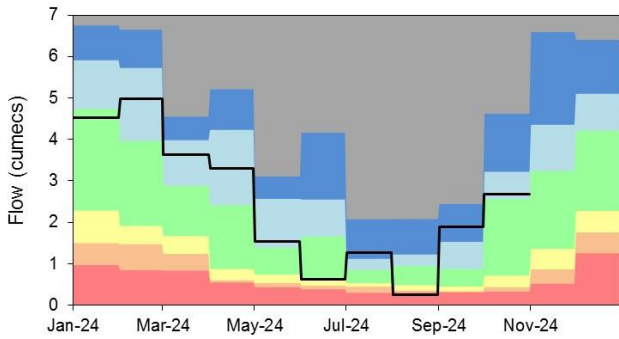
Tadcaster, River Wharfe
Ranking derived from data for the period Jul-1991 to Dec-2022



Wansford Snakeholm Lock, West Beck
Ranking derived from data for the period Nov-1988 to Dec-2022



Whittington, River Rother
Ranking derived from data for the period Nov-1979 to Dec-2022



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5 Groundwater levels

5.1 Groundwater levels map

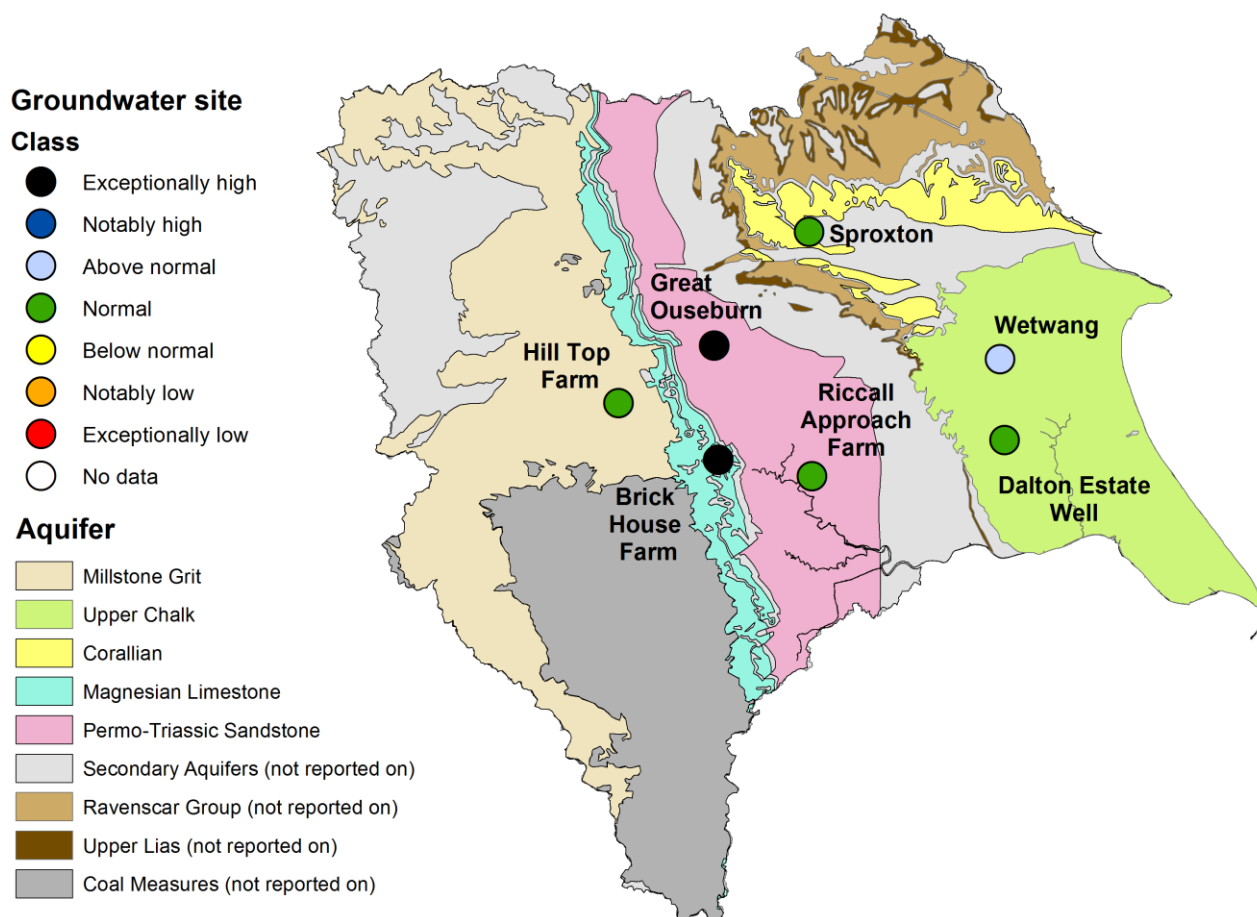
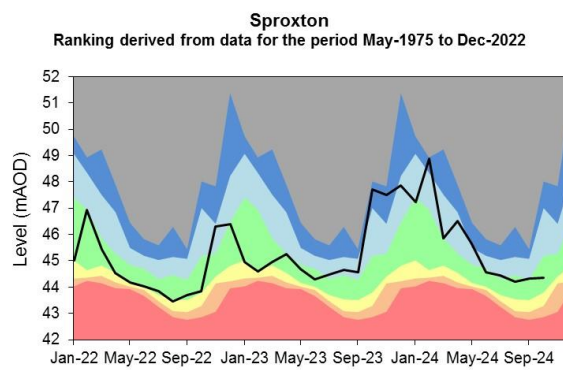
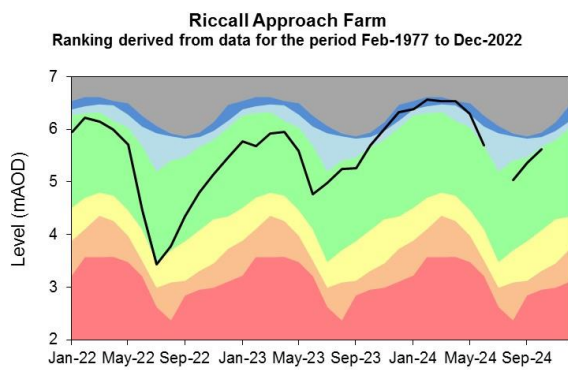
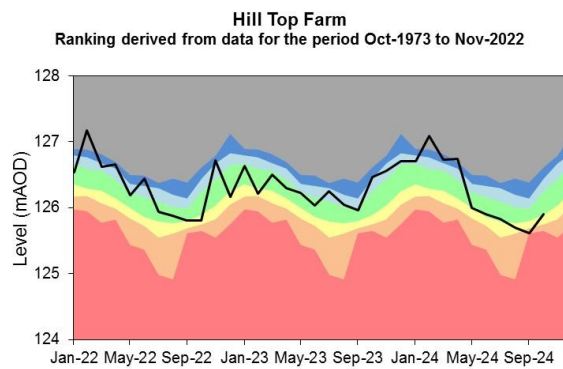
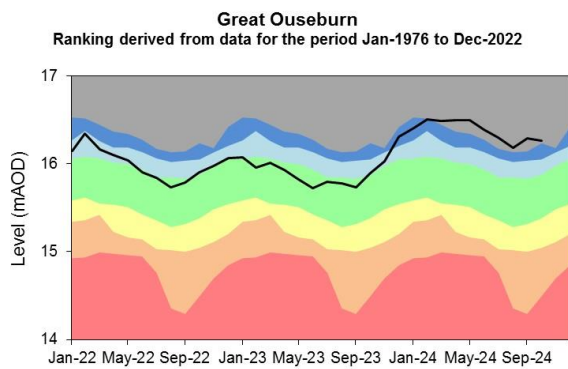
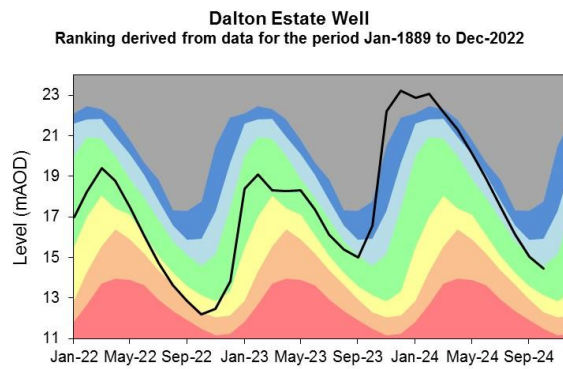
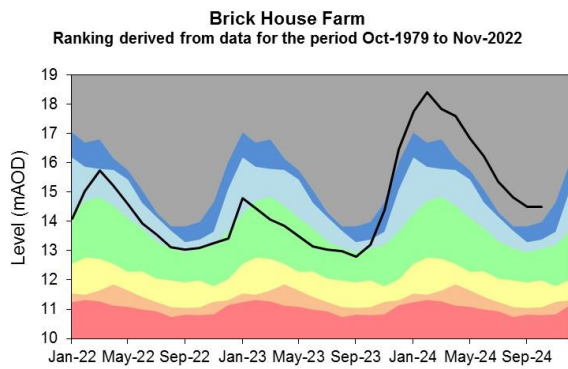


Figure 5.1: Groundwater levels for indicator sites at the end of October 2024, classed relative to an analysis of respective historic October levels. Table available in the appendices with detailed information.

(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



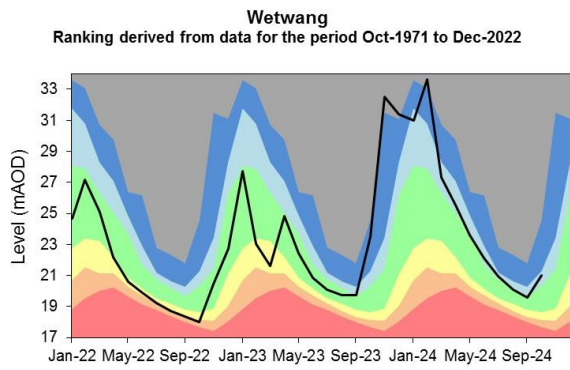
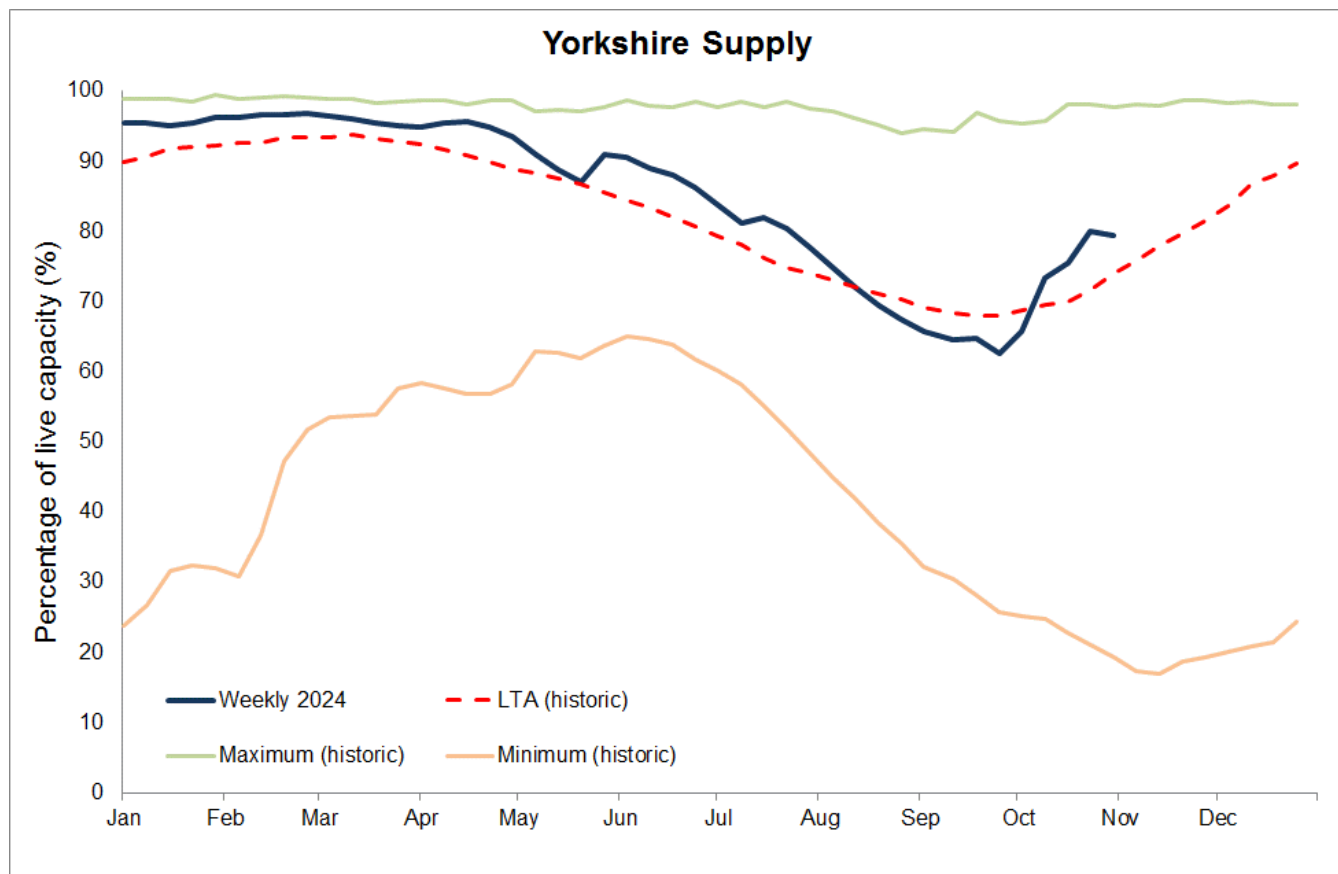


Figure 5.2: End of month groundwater levels at index groundwater level sites for major aquifers. 22 months compared to an analysis of historic end of month levels.

(Source: Environment Agency). Crown copyright. All rights reserved. Environment Agency, 100024198, 2024. N.B. Hill Top Farm observation borehole is used for abstraction. Therefore the groundwater level record will be directly affected by pumping

6 Reservoir stocks

Figure 6.1: End of month regional reservoir stocks compared to long term maximum, minimum and average stocks. Note: Historic records of individual reservoirs and reservoir groups making up the regional values vary in length.



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

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	Oct 2024 rainfall % of long term average 1961 to 1990	Oct 2024 band	Aug 2024 to October cumulative band	May 2024 to October cumulative band	Nov 2023 to October cumulative band
Aire	89	Normal	Normal	Normal	Exceptionally high
Calder	82	Normal	Normal	Normal	Exceptionally high
Dales North Sea Tribs	99	Normal	Normal	Above normal	Exceptionally high
Derwent (ne)	103	Normal	Normal	Normal	Notably high
Don	110	Normal	Normal	Normal	Exceptionally high
Hull And Humber	109	Normal	Normal	Normal	Exceptionally high
Nidd	90	Normal	Normal	Normal	Exceptionally high
Ouse	107	Normal	Normal	Normal	Notably high
Rye	98	Normal	Normal	Normal	Notably high
Swale (ne)	106	Normal	Normal	Normal	Exceptionally high

Ure	92	Normal	Normal	Normal	Exceptionally high
Wharfe	90	Normal	Normal	Normal	Exceptionally high

8.2 River flows table

Site name	River	Catchment	Oct 2024 band	Sep 2024 band
Addingham	Wharfe	Wharfe Middle	Normal	Normal
Birstwith	Nidd	Nidd Middle	Normal	Above normal
Briggswath	Esk	Esk Yorks	Above normal	Notably high
Buttercrambe	Derwent	Derwent Yorks Middle	Above normal	Above normal
Crakehill Topcliffe	Swale	Swale Lower	Above normal	Above normal
Doncaster	Don	Don Lower	Notably high	Above normal
Elland	Calder	Calder Yorks Upper	Normal	Normal
Hunsingore	Nidd	Nidd Lower	Normal	Above normal
Kildwick	Aire	Aire Upper	Normal	Normal
Kilgram Bridge	Ure	Ure Middle	Normal	Normal
Ness	Rye	Rye	Normal	Normal
Skelton	Ouse	Ouse Yorks	Normal	Above normal
Tadcaster	Wharfe	Wharfe Lower	Normal	Normal
Wansford Snakeholm Lock	West Beck	Hull Upper	Above normal	Above normal

Whittington	Rother	Rother Yorks	Above normal	Notably high
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8.3 Groundwater table

Site name	Aquifer	End of Oct 2024 band	End of Sep 2024 band
Brick House Fm	Wharfe Magnesian Limestone	Exceptionally high	Exceptionally high
Dalton Estate Well	Hull & East Riding Chalk	Normal	Normal
Great Ouseburn	Sherwood Sandstone	Exceptionally high	Exceptionally high
Hill Top Fm	Millstone Grit And Carboniferous Limestone	Normal	Notably low
Riccall Approach Farm	Sherwood Sandstone	Normal	Normal
Sproxton	Sherwood Sandstone	Normal	Above normal
Wetwang	Hull & East Riding Chalk	Above normal	Normal