Monthly water situation report: Yorkshire Area

1 Summary - June 2024

After a wet winter and spring, June produced more typical rainfall and river flow conditions. Rainfall was slightly below average, especially in East and South Yorkshire. River flows declined overall. Soils became drier in the second half of the month. Groundwater levels declined in all aquifers and remained above average apart from the Millstone Grit. Reservoir stocks showed a small decrease but remained above normal for the time of year.

1.1 Rainfall

The rain that fell in June was in the normal range for all catchments, between 65% and 90% of the long term average (LTA).

In the first week rainfall was minimal and was a combination of both dry days and low rainfall totals across all catchments. The wettest days across Yorkshire were 9 and 15 July, with a further event in the western Pennines on 27 July. An isolated rain event occurred on day 9 and most catchments recorded daily totals of around 10mm. Between day 13 to 17 rain gauges across Yorkshire recorded rainfall totals of around 25mm, with the exception of the Upper Aire gauge at Gorpley recording 43.2mm. The highest daily total recorded in the month was in South Yorkshire, where the gauge at Cannon Hall recorded 30.2mm on day 18, equivalent to 51% of the LTA for June.

Day 18 to day 26 was a settled period across Yorkshire. In fact from day 18 to 27 there was no rain recorded in the Hull catchment.

1.2 Soil moisture deficit (SMD)

Soils were classified as wet at the start of the month, with the exception of the lower Hull and Ouse catchments which were normal. There was little change in the first 2 weeks except the lower parts of the Don, Calder and Aire dried slightly into the normal range. In the second half of the month soils began to drain, with SMD increasing by around 25mm in the western Pennines and by 35mm to 40mm elsewhere. At month end most of Yorkshire's soils were in the normal range with the lower Hull and Ouse classed as dry.

1.3 River flows

Monthly mean flows were normal to above normal for most catchments, between 84% and 140% of the LTA and below normal in the Rother at 45% of the LTA. Catchments with more

groundwater support from previous wet months, namely the Rye, Derwent and Hull had above normal monthly mean flows compared with normal values in the Pennine catchments.

From the beginning of June most Yorkshire catchments were reporting daily mean flows in the normal to above normal range and this pattern continued for the first 14 days. Flows generally declined, with small fluctuations in response to rainfall. The Don and Rother recorded their highest flow of the month on day 10 and 9 respectively although this was not a major flow peak.

Flows increased during the third week of June to notably high in the Yorkshire Dales catchments and the Esk, Rye and Derwent. Most rivers peaked on 15 or 16 July and the more slowly responding Ouse and Derwent on 17 July. The Calder and Don fluctuated between normal and above normal range.

Flow receded for the last week of the month and returned to the normal range for June, with the Rother reaching below normal. The Chalk-fed West Beck had slowly declining flows throughout the month, but still within the above normal range for June.

1.4 Groundwater levels

Magnesian Limestone

The groundwater level within the Magnesian Limestone at Brick House Farm continued to decrease but remained exceptionally high for the time of year.

Millstone Grit

The groundwater level decreased within the Millstone Grit at Hill Top Farm and remained normal for the time of 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 groundwater level in the Sherwood Sandstone decreased. Levels at Great Ouseburn remained exceptionally high but Riccall Approach Farm decreased to above normal.

Corallian Limestone

The groundwater level decreased within the Corallian Limestone at Sproxton into the normal range for the time of year.

Chalk

The groundwater level decreased at both Wetwang (northern Yorkshire Wolds chalk) and Dalton Estate (central Yorkshire Wolds chalk). Levels at both sites were above normal for the time of year.

1.5 Reservoir stocks

A small 4.3% decline of overall reservoir stocks occurred from the start to the end of the month. At the end of June stocks were 4% above the LTA.

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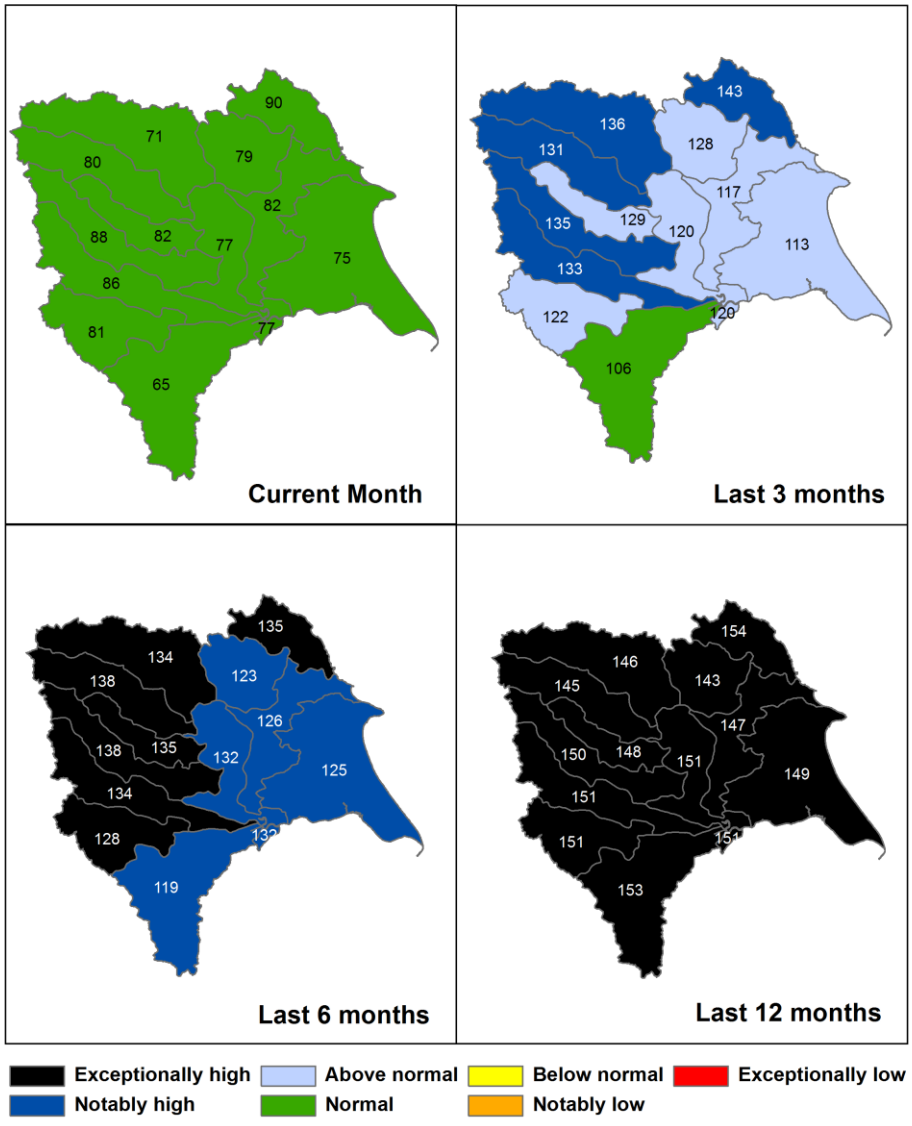
2 Rainfall

2.1 Rainfall map

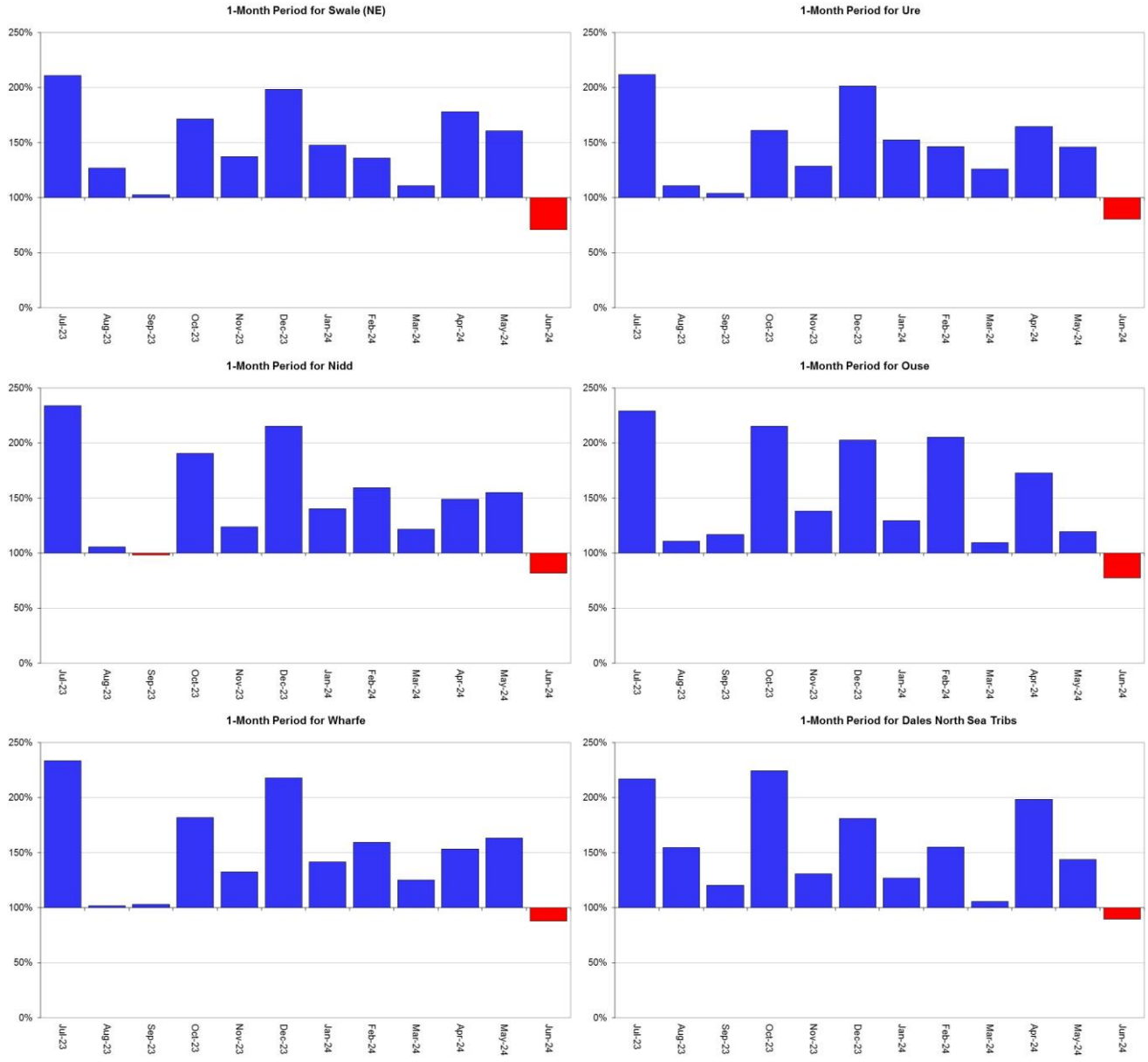
Figure 2.1: Total rainfall for hydrological areas for the current month (up to 30 June 2024), the last 3 months, the last 6 months, and the last 12 months, classed relative to an analysis of respective historic totals. Table available in the appendices with detailed information.

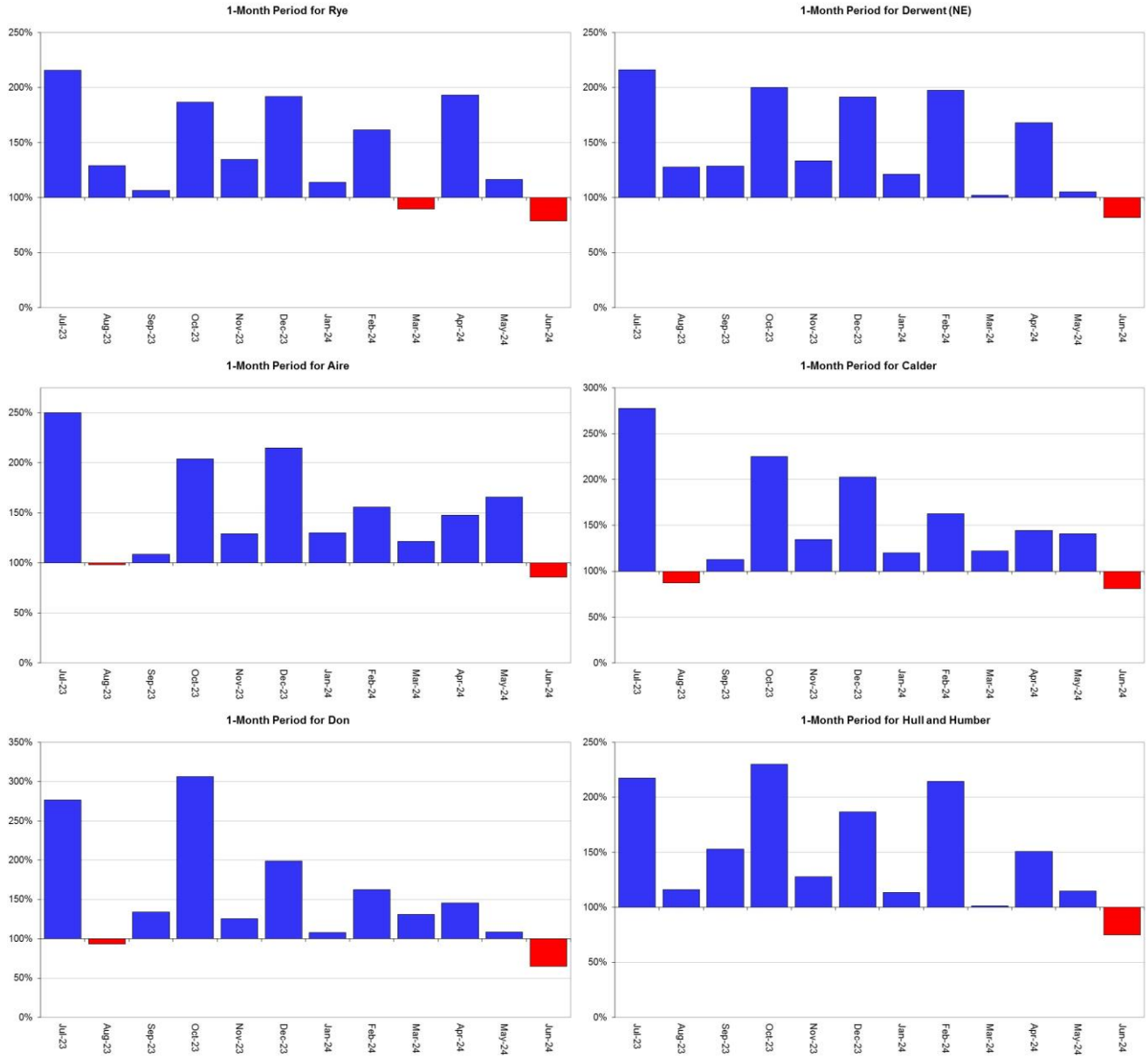


HadUK data based on the Met Office 1km gridded rainfall dataset derived from rain gauges (Source: Met Office. Crown copyright, 2024). Provisional data based on Environment Agency 1km gridded rainfall dataset derived from Environment Agency intensity rain gauges. Crown copyright. All rights reserved. Environment Agency, 100024198, 2024.

2.2 Rainfall charts

Figure 2.2: Monthly rainfall totals for the past 24 months as a percentage of the 1961 to 1990 long term average for each region and for England.



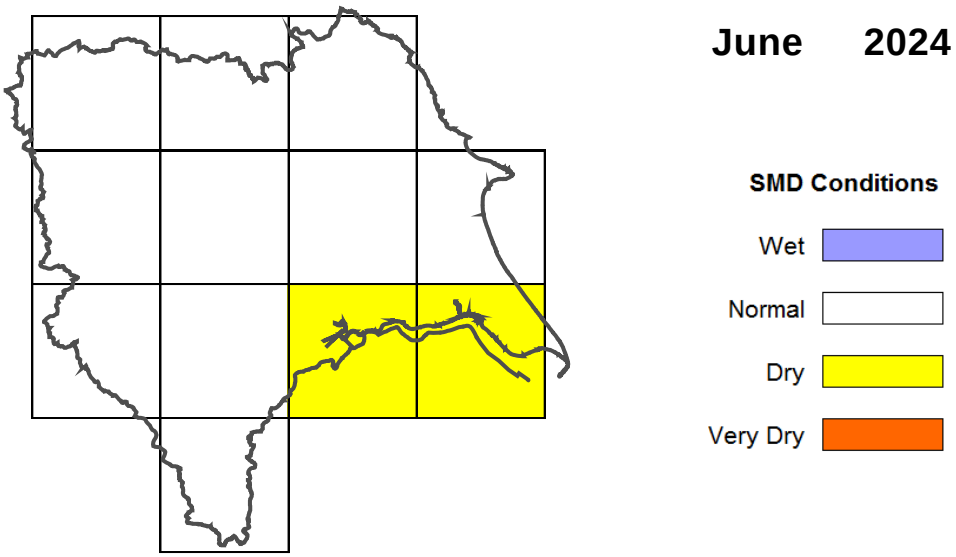


Rainfall data for 2023 and 2024, extracted from Environment Agency 1km gridded rainfall dataset derived from Environment Agency intensity rain gauges. (Source: Environment Agency. Crown Copyright, 100024198, 2024). Rainfall data prior to 2023, extracted from Met Office HadUK 1km gridded rainfall dataset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

3 Soil moisture deficit

3.1 Soil moisture deficit map

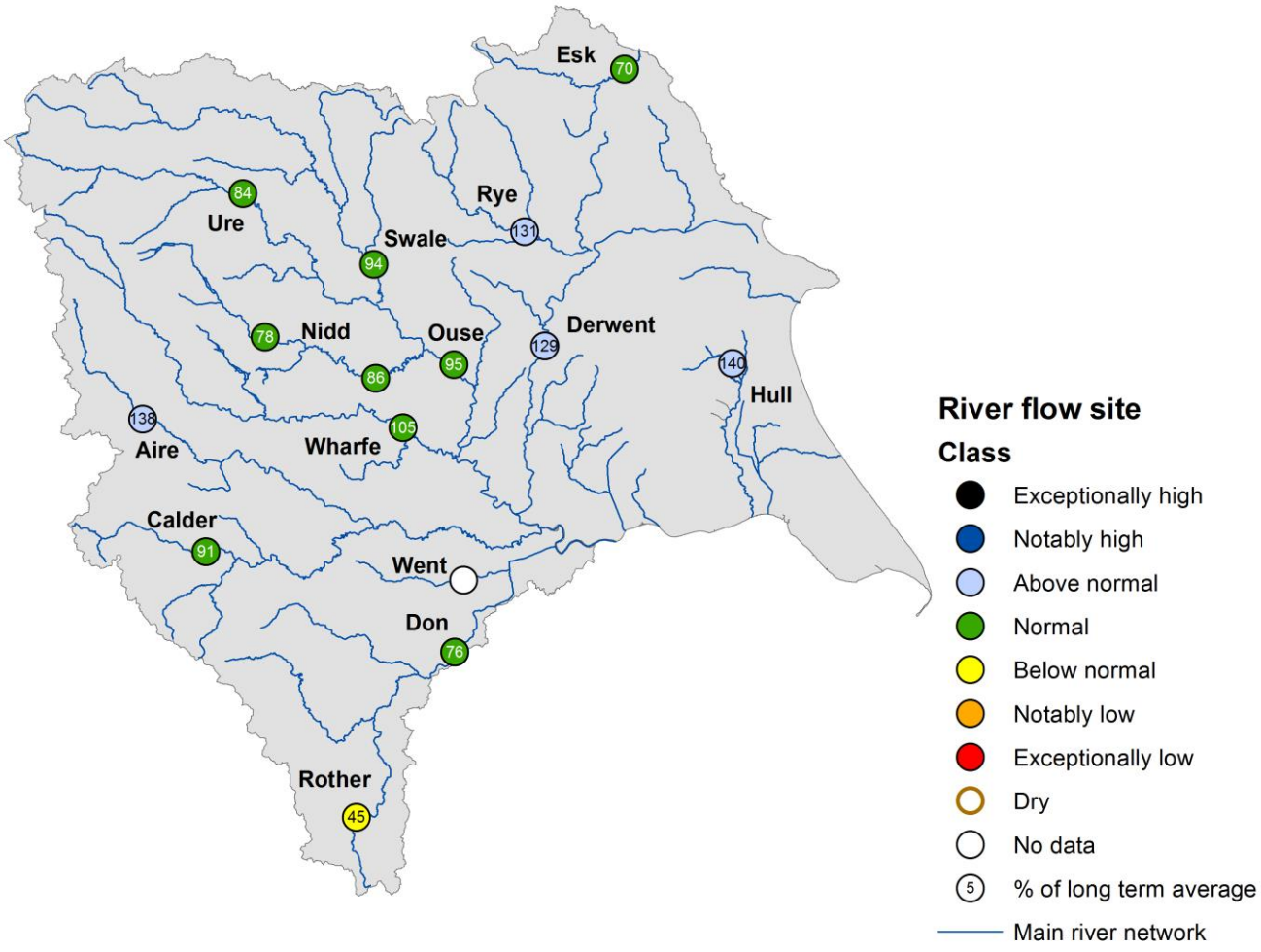
Figure 3.1: Soil moisture deficits for weeks ending 30 June 2024. Shows the difference (mm) of the actual soil moisture deficit from the 1961 to 1990 long term average soil moisture deficits. MORECS data for real land use.



4 River flows

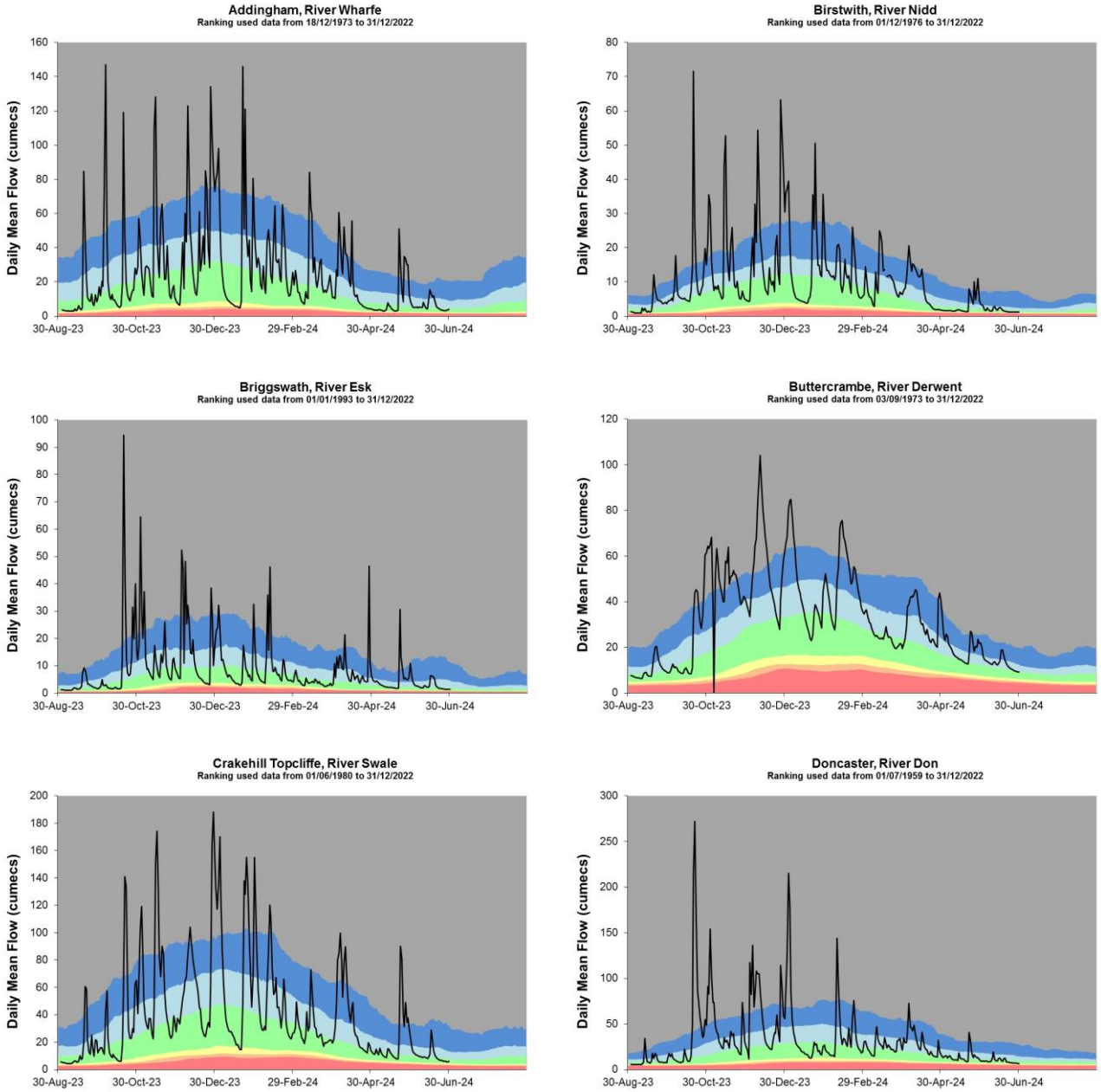
4.1 River flows map

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

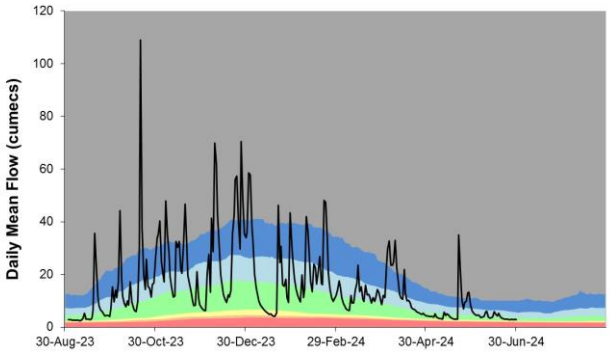


4.2 River flow charts

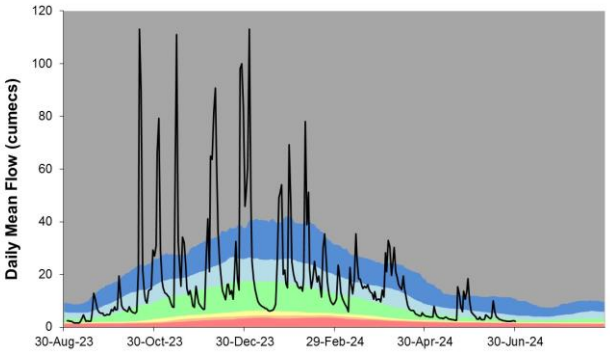
Figure 4.2: Daily mean river flow for index sites over the past year, compared to an analysis of historic daily mean flows.



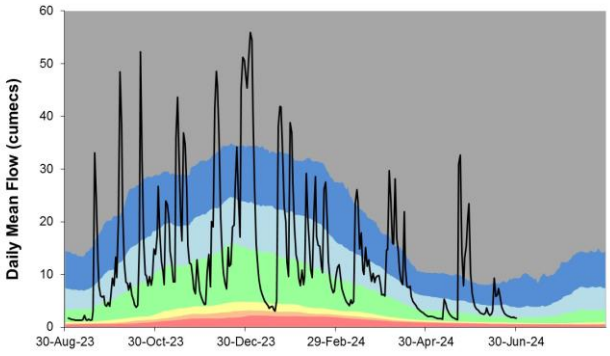
Elland, River Calder
Ranking used data from 01/07/1971 to 31/12/2022



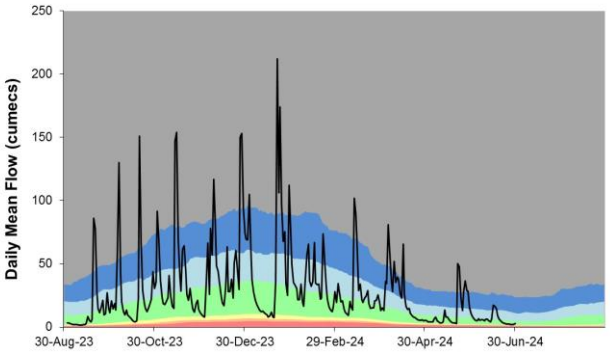
Hunsingore, River Nidd
Ranking used data from 01/10/1968 to 31/12/2022



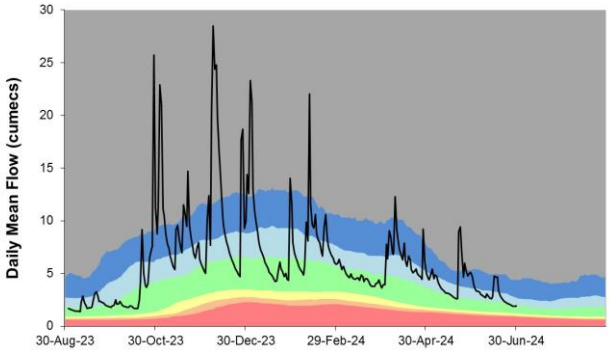
Kildwick, River Aire
Ranking used data from 01/08/1971 to 31/12/2022



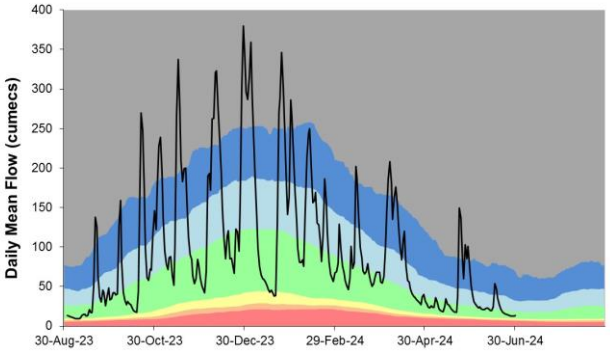
Kilgram Bridge, River Ure
Ranking used data from 01/08/1971 to 31/12/2022

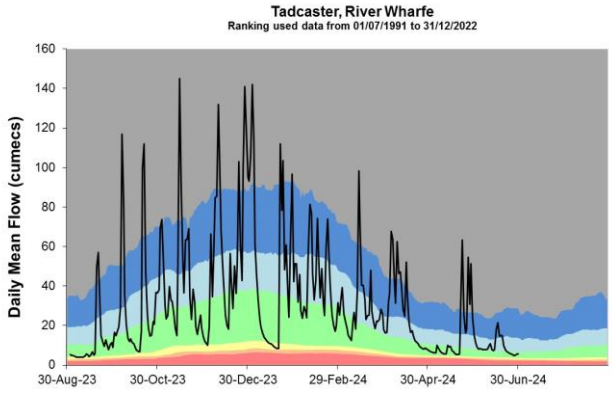


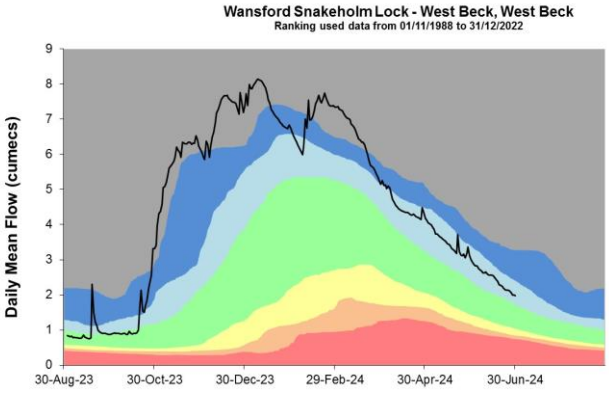
Ness, River Rye
Ranking used data from 01/09/1974 to 31/12/2022

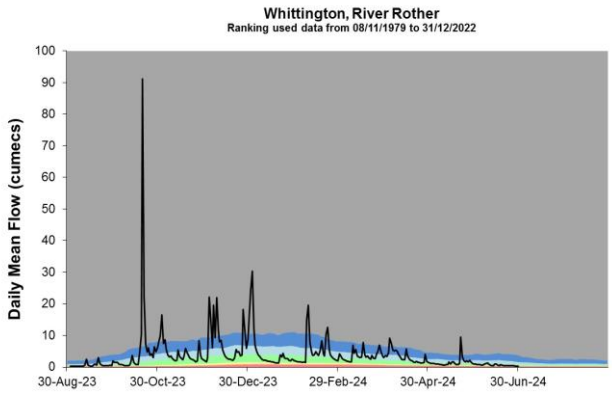


Skelton, River Ouse
Ranking used data from 18/09/1969 to 31/12/2022





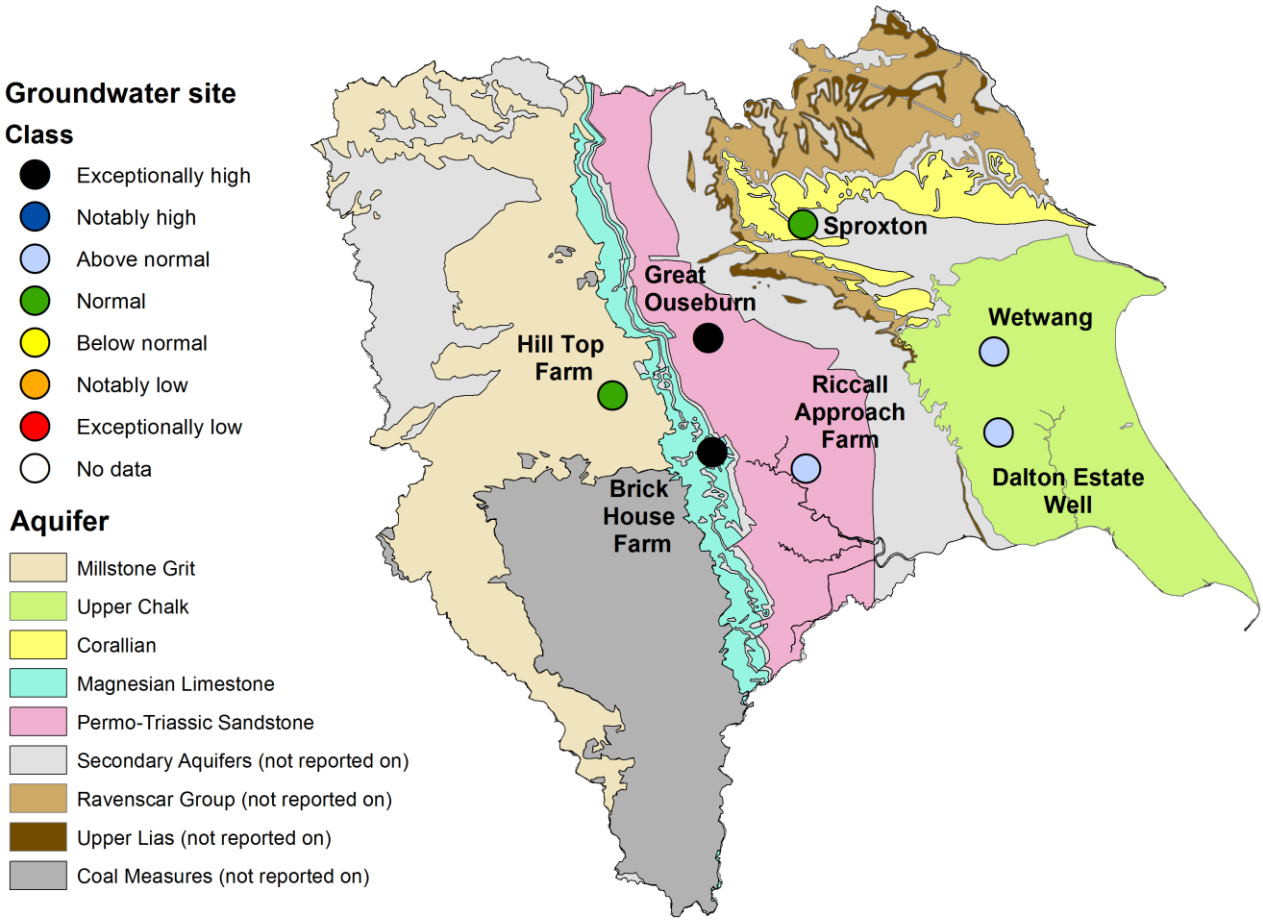




5 Groundwater levels

5.1 Groundwater levels map

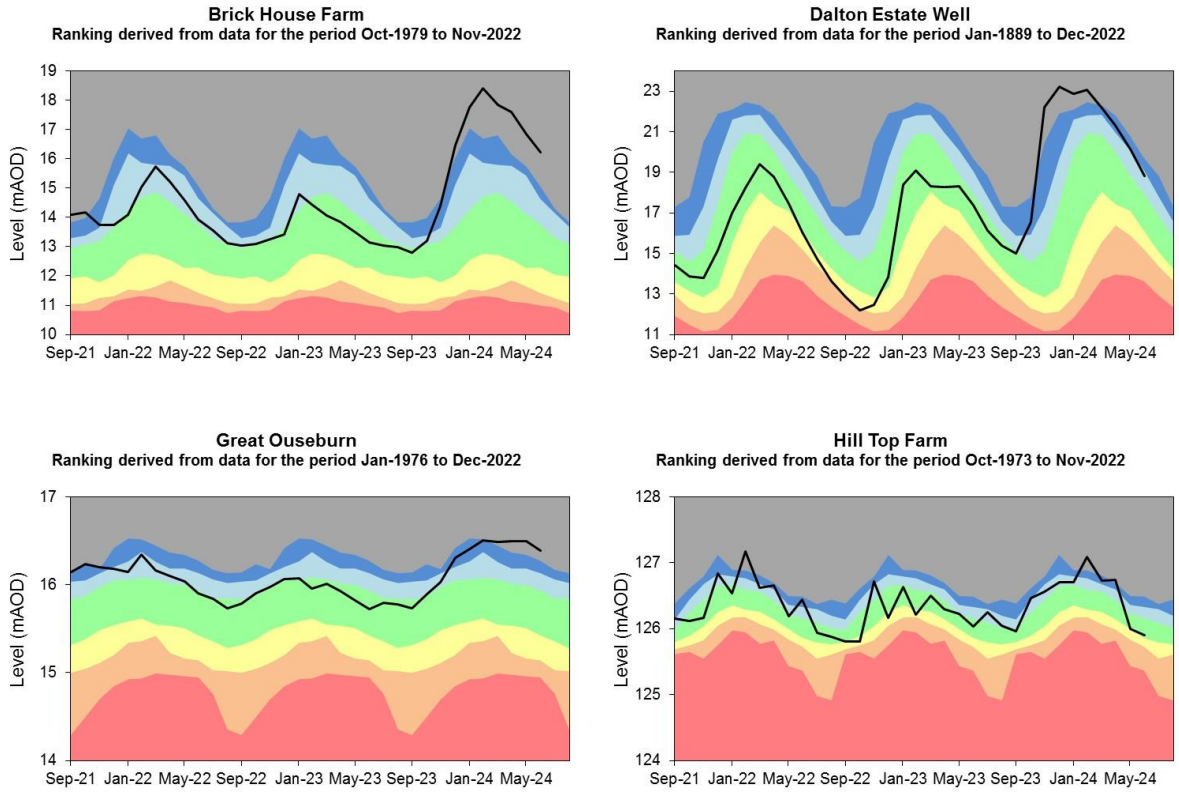
Figure 5.1: Groundwater levels for indicator sites at the end of June 2024, classed relative to an analysis of respective historic June levels. Table available in the appendices with detailed information.

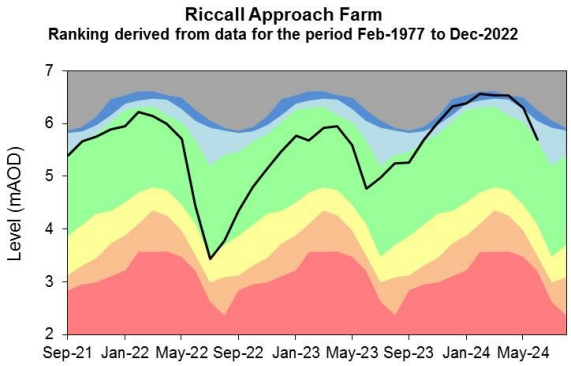


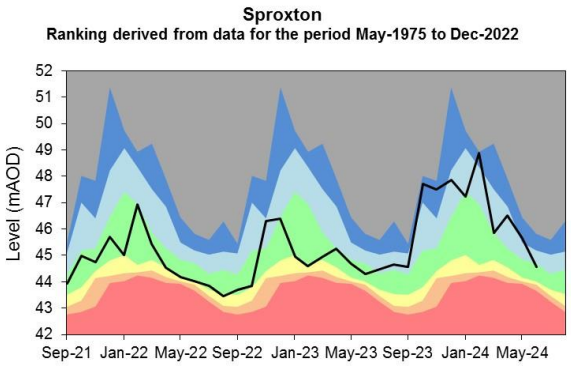
(Source: Environment Agency). Geological map reproduced with kind permission from UK Groundwater Forum, BGS copyright NERC. Crown copyright. All rights reserved. Environment Agency, 100024198, 2024.

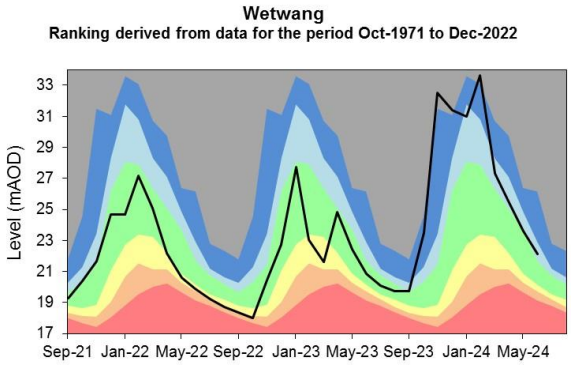
5.2 Groundwater level charts

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.





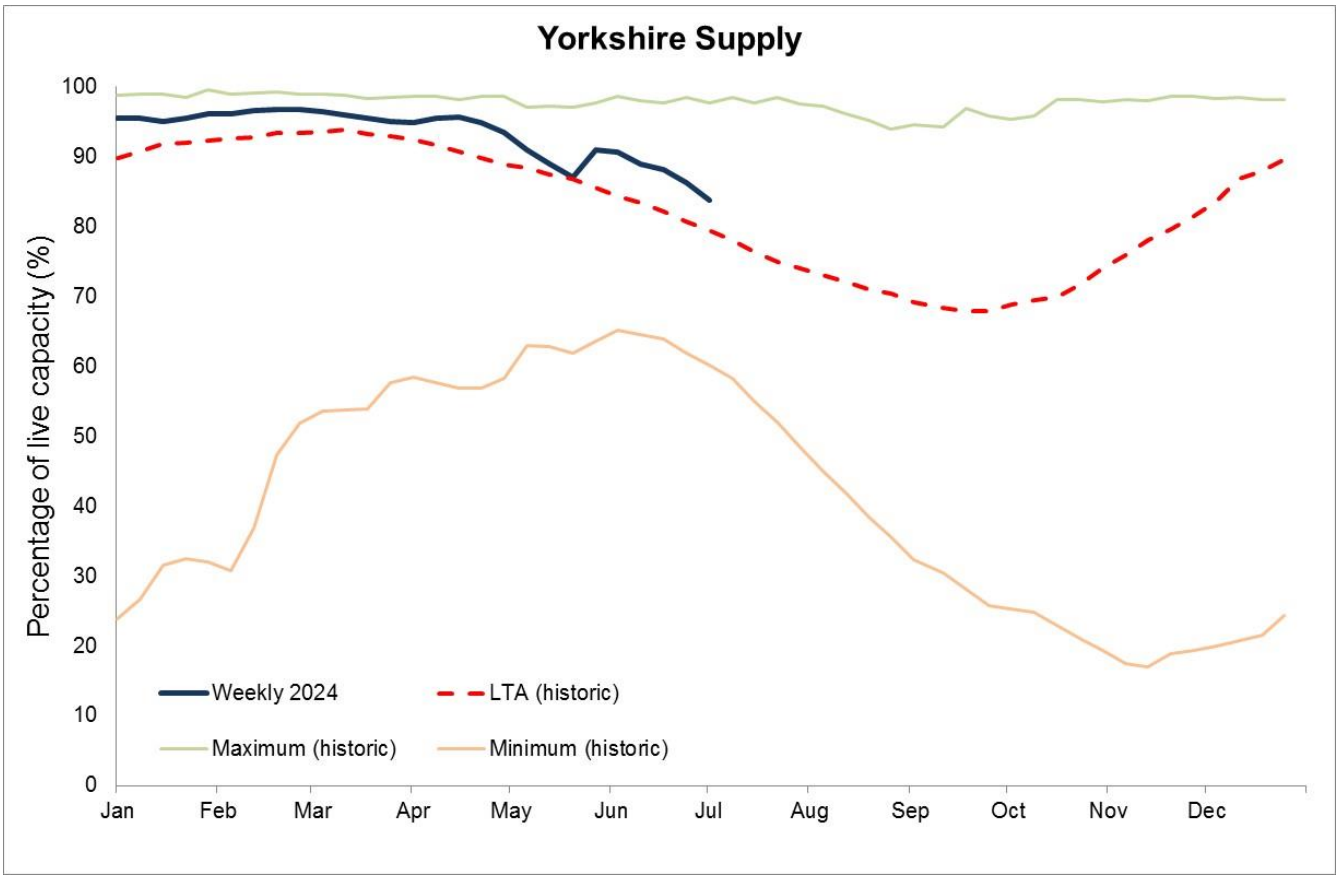




 N.B. Hill Top Farm observation borehole is used for abstraction. Therefore the groundwater level record will be directly affected by pumping

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.



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	Jun 2024 rainfall % of long term average 1961 to 1990	Jun 2024 band	Apr 2024 to June cumulative band	Jan 2024 to June cumulative band	Jul 2023 to June cumulative band
Aire	86	Normal	Notably high	Exceptionally high	Exceptionally high
Calder	81	Normal	Above normal	Exceptionally high	Exceptionally high
Dales North Sea Tribs	90	Normal	Notably high	Exceptionally high	Exceptionally high
Derwent (ne)	82	Normal	Above normal	Notably high	Exceptionally high
Don	65	Normal	Normal	Notably high	Exceptionally high
Hull And Humber	75	Normal	Above normal	Notably high	Exceptionally high
Nidd	82	Normal	Above normal	Exceptionally high	Exceptionally high
Ouse	77	Normal	Above normal	Notably high	Exceptionally high
Rye	79	Normal	Above normal	Notably high	Exceptionally high

Swale (ne)	71	Normal	Notably high	Exceptionally high	Exceptionally high
Ure	80	Normal	Notably high	Exceptionally high	Exceptionally high
Wharfe	88	Normal	Notably high	Exceptionally high	Exceptionally high

8.2 River flows table

Site name	River	Catchment	Jun 2024 band	May 2024 band
Addingham	Wharfe	Wharfe Middle	Normal	Above normal
Birstwith	Nidd	Nidd Middle	Normal	Above normal
Briggswath	Esk	Esk Yorks	Normal	Notably high
Buttercrambe	Derwent	Derwent Yorks Middle	Above normal	Above normal
Crakehill Topcliffe	Swale	Swale Lower	Normal	Above normal
Doncaster	Don	Don Lower	Normal	Above normal
Elland	Calder	Calder Yorks Upper	Normal	Above normal
Hunsingore	Nidd	Nidd Lower	Normal	Above normal
Kildwick	Aire	Aire Upper	Above normal	Notably high
Kilgram Bridge	Ure	Ure Middle	Normal	Above normal
Ness	Rye	Rye	Above normal	Notably high
Skelton	Ouse	Ouse Yorks	Normal	Above normal
Tadcaster	Wharfe	Wharfe Lower	Normal	Above normal
Walden Stubbs	Went	Don Lower		

Wansford Snakeholm Lock	West Beck	Hull Upper	Above normal	Above normal
Whittington	Rother	Rother Yorks	Below normal	Above normal

8.3 Groundwater table

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