Monthly water situation report: Yorkshire Area

1 Summary - July 2024

1.1 Rainfall

The monthly rainfall for July was within normal range for the majority of Yorkshire catchments, between 95% and 140% of the long term average (LTA). The exception to this was in the Rye and Esk catchments, which received higher rainfall totals and classified as above normal to notably high rainfall for July, 146% and 205% of the LTA respectively. This was due to the heavy rain that fell in a 24 hour period on day 9 and also on day 13 in the Esk and east Yorkshire coastal areas. The Met Office Had-UK data set from 1871 to present shows that it has been the 7th wettest January to July on record for Yorkshire.

After a moderately wet first two days, the remainder of the first week of July featured settled conditions across Yorkshire. A series of thundery events affected most Yorkshire catchments across days 8, 9 and 10. The highest of the rainfall totals were in the north east of Yorkshire on day 9, where totals of 33mm were measured which represented approximately 50% of the month's LTA.

From day 10 to 14, small rainfall totals were recorded across Yorkshire, then another rainfall event occurred on day 15 in the Don and Rother catchments, where around 30% of the monthly total fell.

In the final fortnight from day 16 to 31 there were much more settled conditions across Yorkshire and if rain was measured they were small values and much more typical for July.

1.2 Soil moisture deficit

At the start of July the soil moisture deficit (SMD) for most of Yorkshire was classed as normal, and dry to the east of the Area. Soils became wetter during the first two weeks. This was most notable in the west of the area where this trend continued into week three. Soils dried in the second half of them month by about 20mm of SMD per week, beginning in east and central Yorkshire. By the end of the month, there was a split where areas to the southeast were classified as dry and those to the north and west were normal.

1.3 River flows

The monthly mean river flows ranged from normal to notably high and between 74% and 287% of the long term average (LTA) for July. There was a split in the catchment behaviour with the Pennine catchments to the west within normal range and those catchments either in the central band or to the east being much higher for July. This mainly reflected the rainfall distribution but also the ongoing influence of groundwater contributions in the Rye, Derwent and Hull catchments.

In the first week flows across most Yorkshire catchments were normal with slight variances to above normal range. In response to a rain event early in the second week, river flows increased in all Yorkshire catchments to notably or exceptionally high on days 9 and 10. In the Nidd, Rother, Derwent, Esk and Rye the flows remained raised into week 3, however elsewhere these had receded back to within normal range.

By the final week of July flows were within normal range for most Pennine-fed catchments, with the reservoir-influenced Nidd, and the Derwent, Esk and Rye to the east still within above normal range. By the last few days on the month only the Rother catchment was reporting flows below normal.

In the Hull catchment there continued to be a gradual decline in flows in the West Beck throughout the month caused by reducing groundwater spring flow from the Chalk. The flows in the West Beck still remained in the above normal range throughout the month.

1.4 Groundwater levels

Magnesian Limestone

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

Millstone Grit

The groundwater level has decreased within the Millstone Grit at Hill Top Farm and remains 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, Great Ouseburn remains exceptionally high.

Corallian Limestone

The groundwater level decreased within the Corallian Limestone at Sproxton but is now above normal for the time of year.

Chalk

The groundwater level decreased at both Wetwang (northern Yorkshire Wolds chalk) and Dalton Estate (central Yorkshire Wolds chalk). Wetwang and Dalton Estate are both above normal

1.5 Reservoir stocks

A small change of reservoir stocks occurred throughout the month with a decline of 6% from the start to month end. Reservoir stocks were approximately 4% more than the LTA for the time of year.

1.6 Environment Impact

By the end of July, 20 hands-off flows were in force and 19 abstractors had been warned that flows are low but were still able to abstract. Affected catchments included the Swale, Rye, Foulness and parts of the Aire and lower Derwent.

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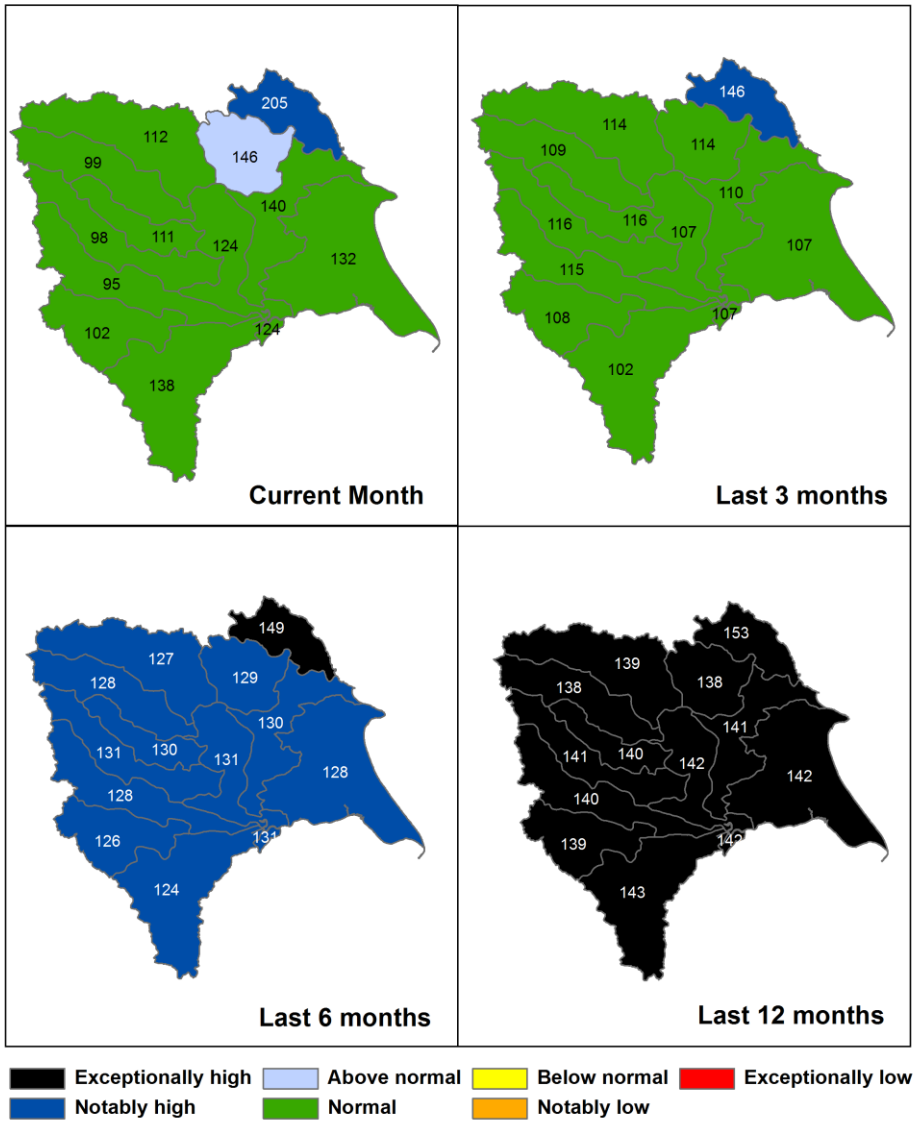
2 Rainfall

2.1 Rainfall map

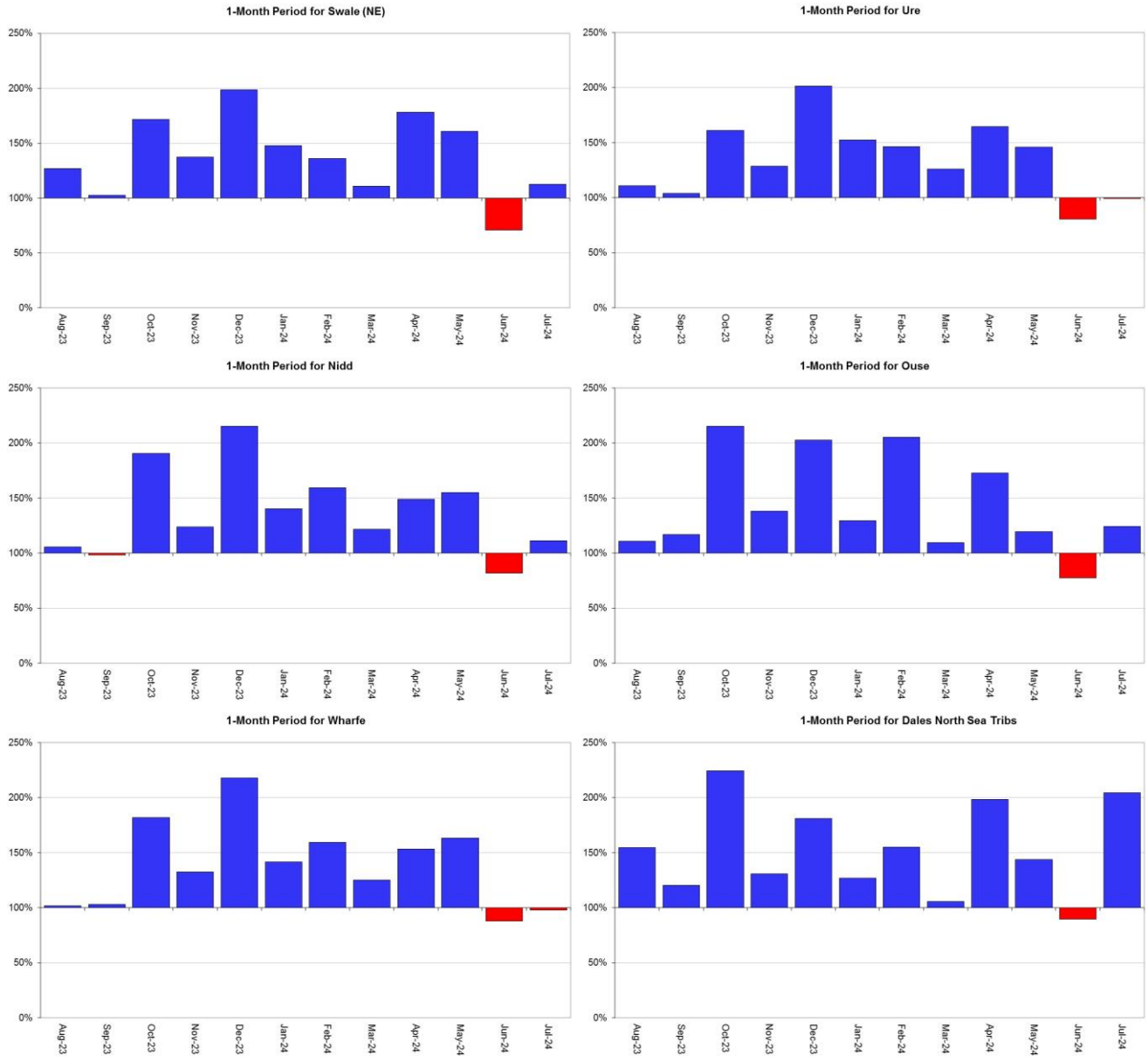
Figure 2.1: Total rainfall for hydrological areas for the current month (up to 31 July 2024), the last 3 months, the last 6 months, and the last 12 months, classed relative to an analysis of respective historic totals. Table available in the appendices with detailed information.

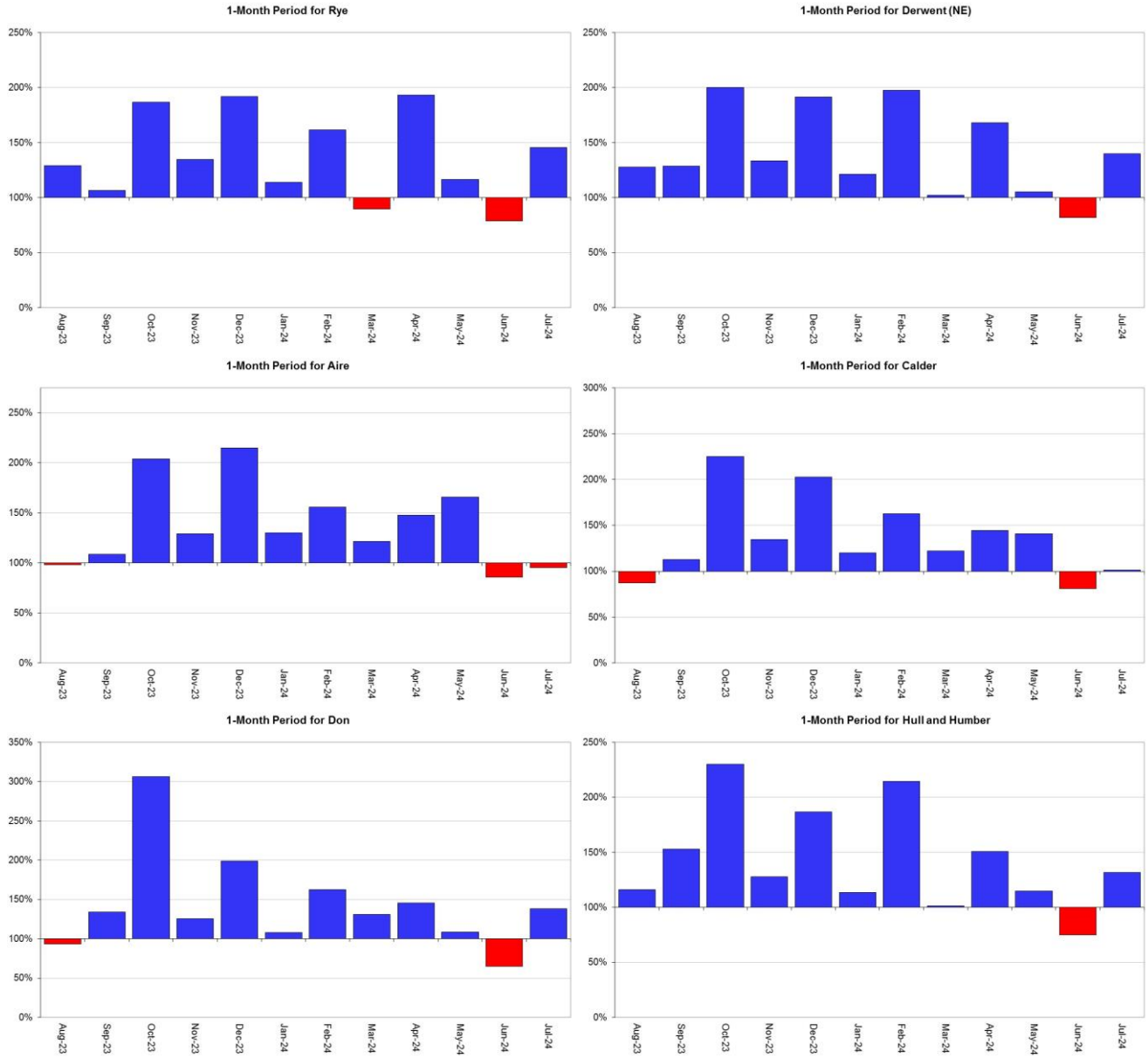


HadUK data based on the Met Office 1km gridded rainfall dataset derived from rain gauges (Source: Met Office. Crown copyright, 2024). Provisional data based on Environment Agency 1km gridded rainfall dataset derived from Environment Agency intensity rain gauges. Crown copyright. All rights reserved.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



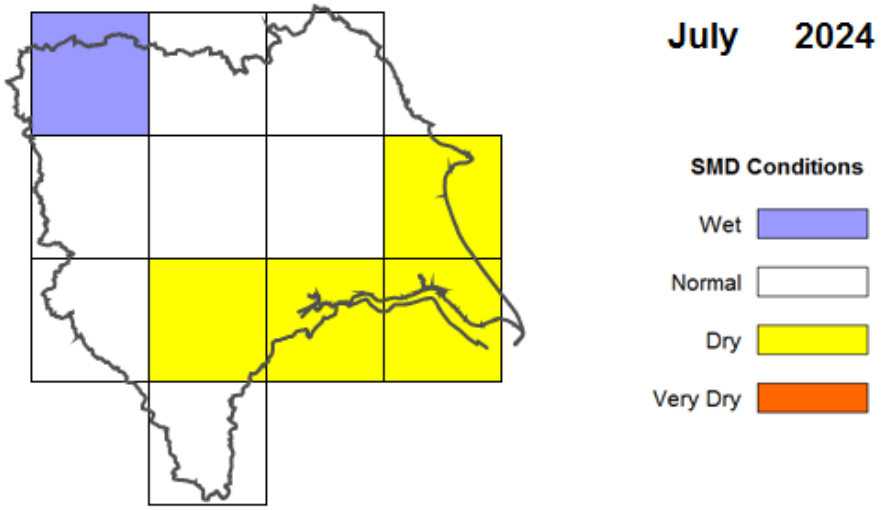


Rainfall data for 2023 and 2024, extracted from Environment Agency 1km gridded rainfall dataset derived from Environment Agency intensity rain gauges. (Source: Environment Agency. Crown Copyright, 100024198, 2024). Rainfall data prior to 2023, extracted from Met Office HadUK 1km gridded rainfall dataset 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 31 July 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

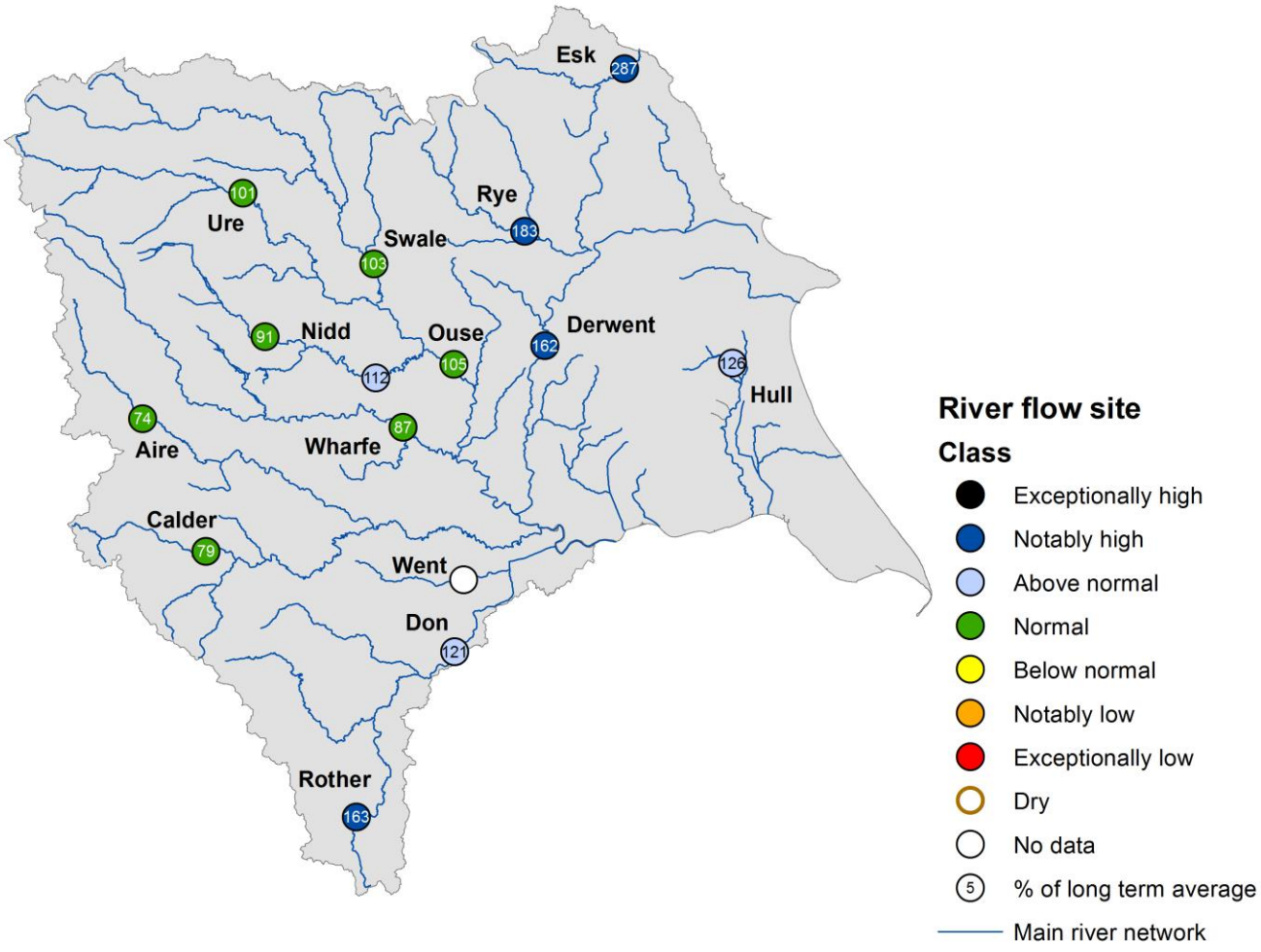
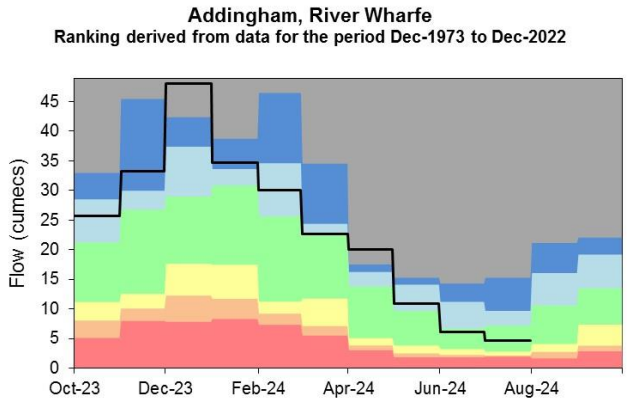
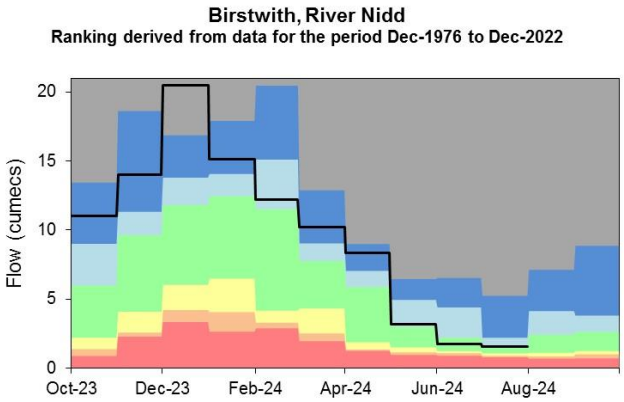


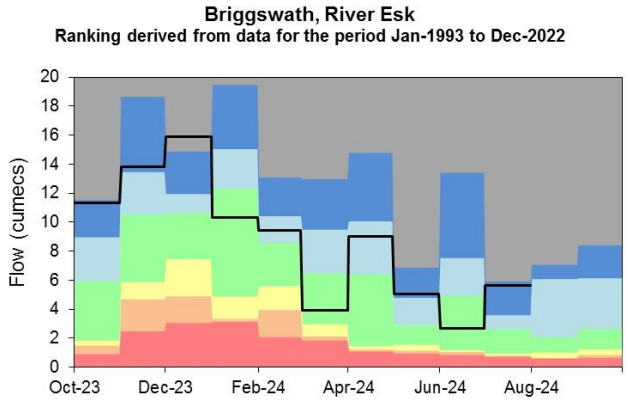
Figure 4.1: Monthly mean river flow for indicator sites for July 2024, expressed as a percentage of the respective long term average and classed relative to an analysis of historic July monthly means Table available in the appendices with detailed information.

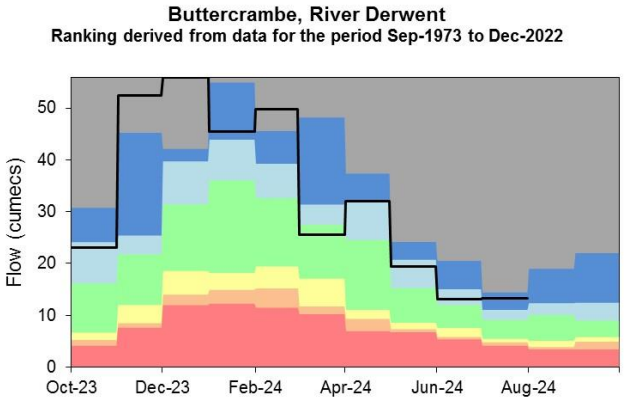
4.2 River flow charts

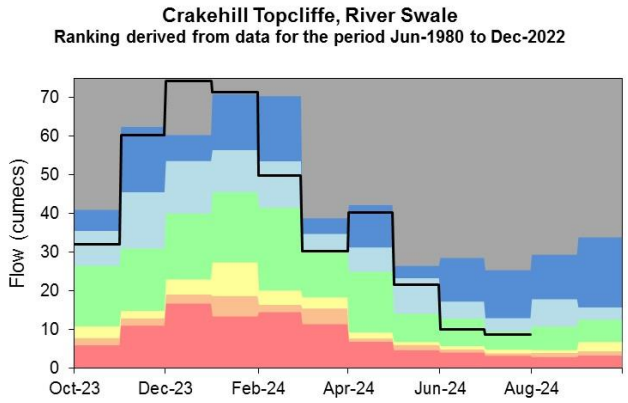
Figure 4.2: Daily mean river flow for index sites over the past year, compared to an analysis of historic daily mean flows.

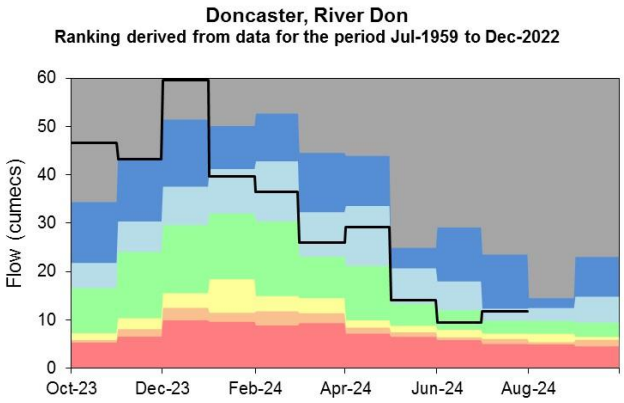




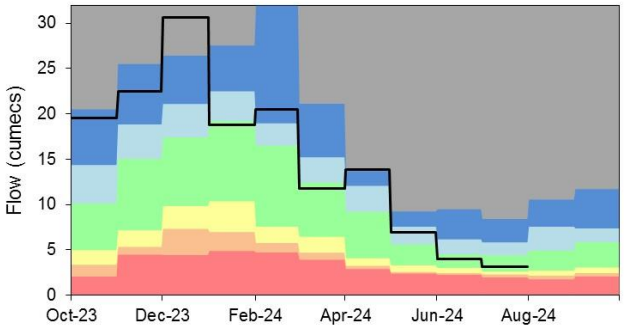




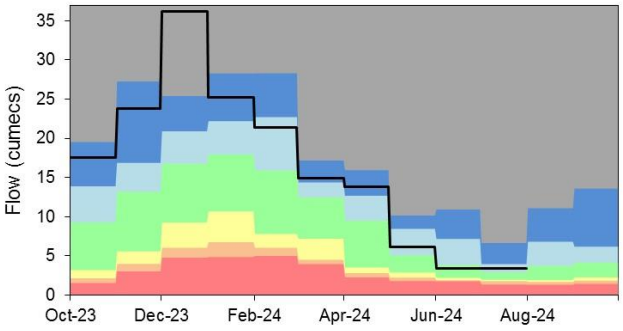




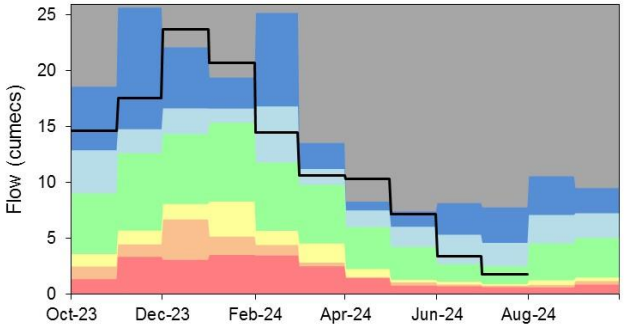
Elland, River Calder
Ranking derived from data for the period Jul-1971 to Dec-2022



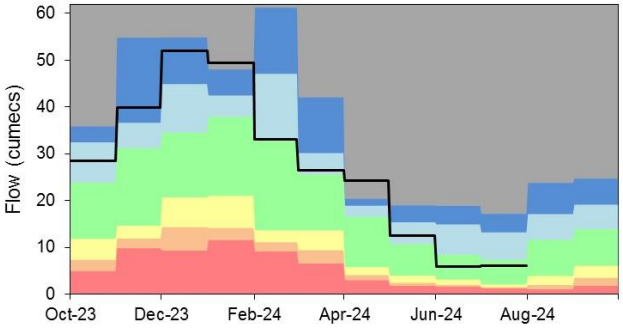
Hunsingore, River Nidd
Ranking derived from data for the period Oct-1968 to Dec-2022



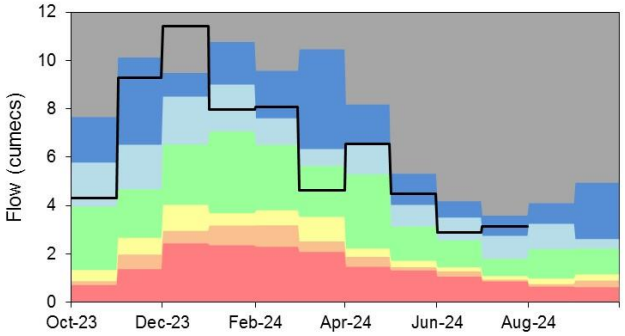
Kildwick, River Aire
Ranking derived from data for the period Aug-1971 to Dec-2022



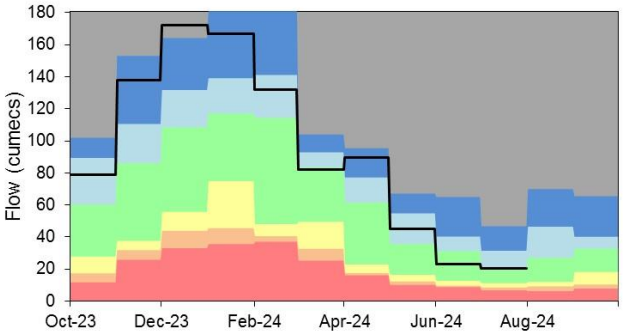
Kilgram Bridge, River Ure
Ranking derived from data for the period Aug-1971 to Dec-2022

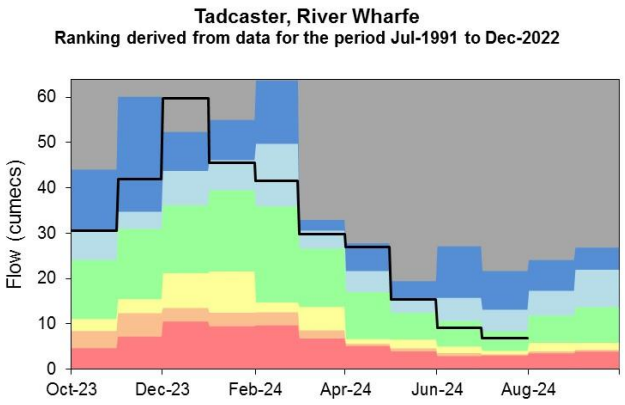


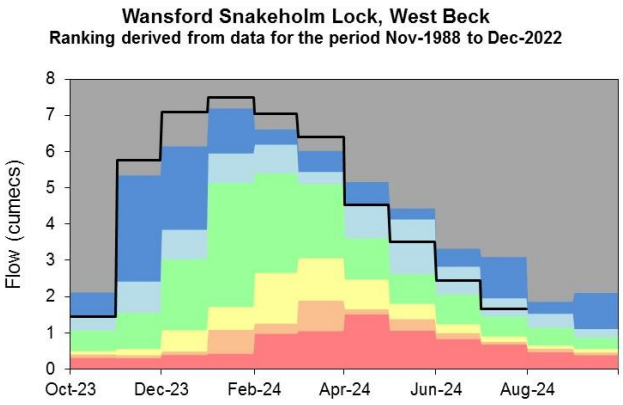
Ness, River Rye
Ranking derived from data for the period Sep-1974 to Dec-2022

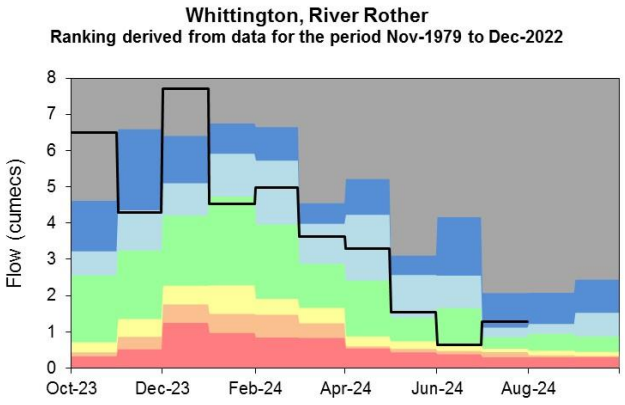


Skelton, River Ouse
Ranking derived from data for the period Sep-1969 to Dec-2022









5 Groundwater levels

5.1 Groundwater levels map

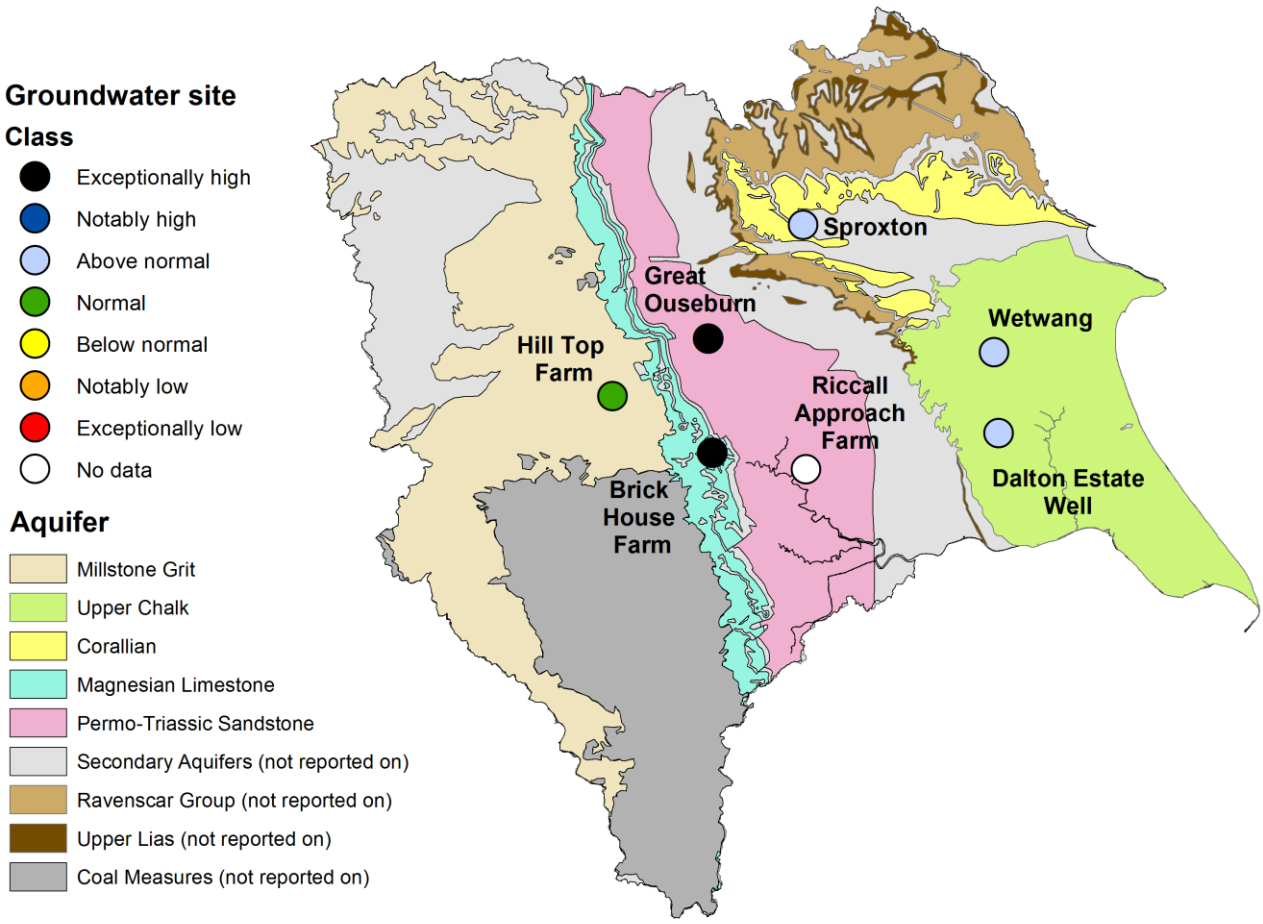
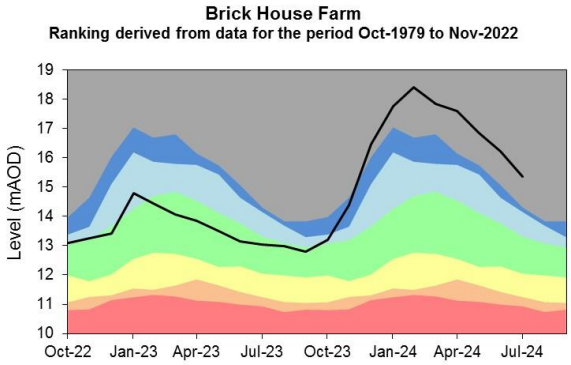
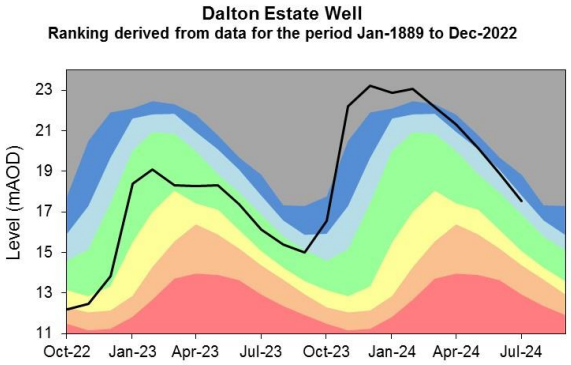
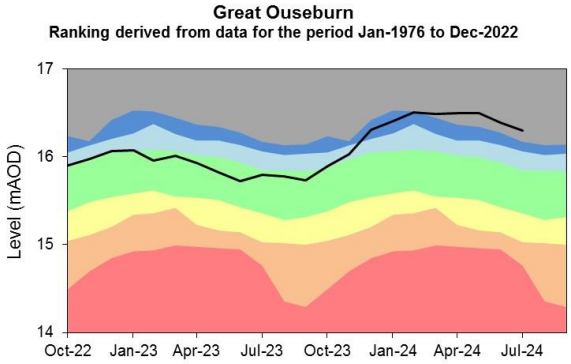


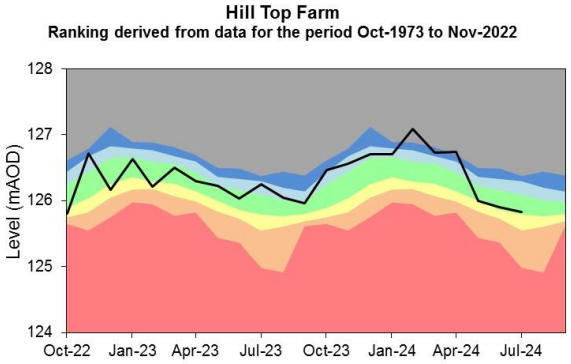
Figure 5.1: Groundwater levels for indicator sites at the end of July 2024, classed relative to an analysis of respective historic July levels. Table available in the appendices with detailed information.

5.2 Groundwater level charts









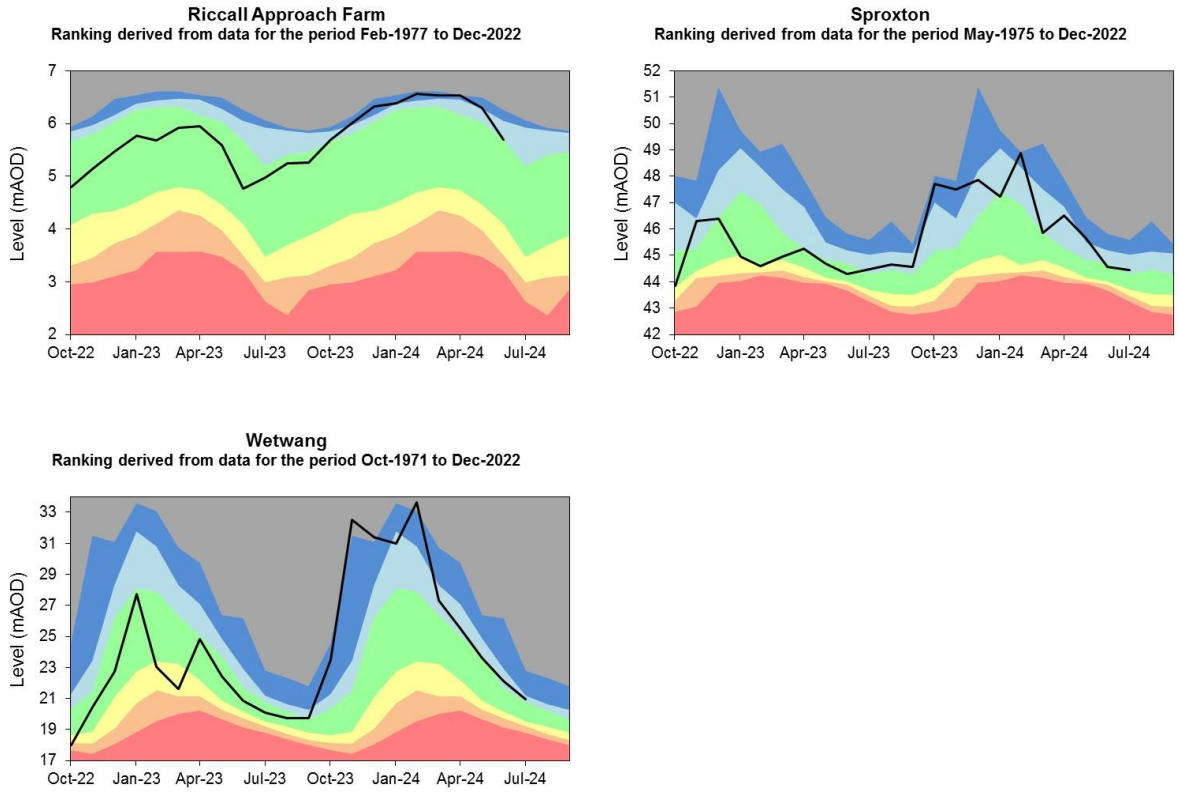
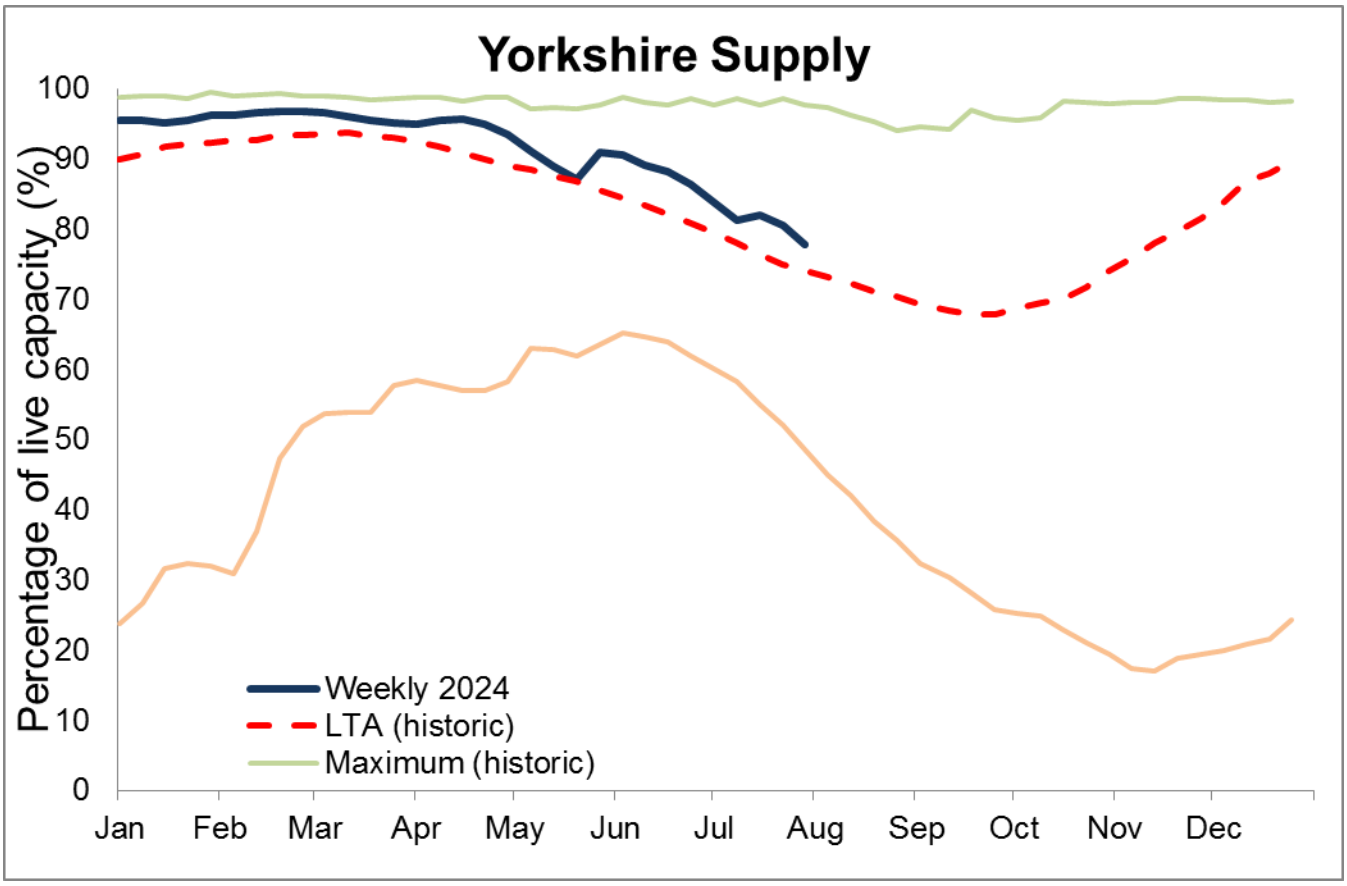


Figure 5.2: End of month groundwater levels at index groundwater level sites for major aquifers. 22 months compared to an analysis of historic end of month.

 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	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
Aire	95	Normal	Normal	Notably high	Exceptionally high
Calder	102	Normal	Normal	Notably high	Exceptionally high
Dales North Sea Tribs	205	Notably High	Notably high	Exceptionally high	Exceptionally high
Derwent (ne)	140	Normal	Normal	Notably high	Exceptionally high
Don	139	Normal	Normal	Notably high	Exceptionally high
Hull And Humber	132	Normal	Normal	Notably high	Exceptionally high
Nidd	111	Normal	Normal	Notably high	Exceptionally high
Ouse	124	Normal	Normal	Notably high	Exceptionally high
Rye	146	Above Normal	Normal	Notably high	Exceptionally high

Swale (ne)	113	Normal	Normal	Notably high	Exceptionally high
Ure	99	Normal	Normal	Notably high	Exceptionally high
Wharfe	98	Normal	Normal	Notably high	Exceptionally high

8.2 River flows table

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

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

8.3 Groundwater table

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