

Monthly water situation report: Midlands

1 Summary - February 2023

Please see Section 7.3 for a map detailing the Midlands regional coverage of this report. The local Areas stated in this report refer to the following counties:

- East Midlands: Derbyshire, Nottinghamshire and Leicestershire
- West Midlands (West): Shropshire, Herefordshire, Worcestershire and Gloucestershire
- West Midlands (East): Staffordshire, Warwickshire and West Midlands.

Rainfall - Compared to the long term average (LTA), rainfall received in February recorded as exceptionally low across 7 hydrological areas, and the remaining 5 hydrological areas recorded as notably low. Rainfall received across all hydrological areas varied between 12% and 25% of the LTA, with majority of areas receiving less than 20% of the LTA.

Soil moisture deficit - Compared to the LTA, soil moisture deficit is above average across the Midlands region. Compared to the end of January, by the end of February soil moisture deficit has increased, with soils becoming drier.

River flows - Compared to the LTA, monthly river flows at the majority of monitoring sites recorded as notably low or lower. Only 2 sites recorded as having normal flows in February, 1 in the south and 1 in the north-eastern part of the region.

Groundwater levels - Compared to the LTA, at the end of February groundwater monitoring sites varied in status, from below normal in 3 sites, to exceptionally high at St. Mary's Church. Compared to the end of January, groundwater status dropped at 2 of the monitoring sites. These were Weir Farm and Rider Point. Ram Hall was the only site to record an increase in its status change, going from below normal in January to normal in February.

Reservoir storage - Compared to the LTA, 7 reservoirs have around average storage and 1 reservoir has above average storage. 2 reservoirs have below average storage. By the end of February, Vyrnwy, Derwent, Tittesworth, Blithfield and Elan experienced a decrease in reservoir storage compared to the end of January.

1.1 Rainfall

Compared to the LTA, rainfall received in February was exceptionally low across most hydrological areas, except for the Welsh Mountains, Lower Wye, Lower Severn Estuary, Dove and Derwent (Midlands) areas, which recorded notably low rainfall totals. Overall, rainfall totals in the Midlands ranged from 12% to 25% of the LTA.

As presented in Figure 2.1, the 3-month rainfall totals for the Midlands hydrological areas are below normal or lower, with the exception of the Welsh Mountains and Derwent (Midlands), which are recorded as having normal totals over the last 3 months. The 6-month rainfall totals across the Midlands hydrological areas are all at normal or above normal status compared to the LTA. Lastly the 12-month rainfall totals are at below normal or notably low status compared to the LTA, with the exception of the Lower Trent which is recording as having normal rainfall totals over the past 12 months.

1.2 Soil moisture deficit and recharge

Compared to the LTA, by the end of February soil moisture deficit (SMD) was above average across the Midlands region. Spatially, the level of SMD is consistent across nearly all areas, being between 11mm and 40mm. Only the western boundary and a small part of the northern boundary have a smaller deficit of less than or equal to 10mm, meaning the soils are slightly wetter than the rest of the region. The difference from the LTA ranges between 6mm and 25mm for most parts of the Midlands. The western boundary and a small part of the northern boundary have deficits closer to that of the LTA, between -5mm and 5mm. Compared to the end of January, at the end of February soil moisture deficit had increased, with soils becoming drier. This could be attributed to the exceptionally low rainfall over the month and relatively dry weather at the end of January.

1.3 River flows

As a result of the dry weather conditions throughout February, low flows have been recorded at nearly all flow monitoring sites. 11 sites spread across the Midlands have recorded as having exceptionally low flows compared to the LTA. A further 6 sites have recorded notably low flows for February. Only 2 sites, Ebley Mill in the south of the region, and Worksop in the north east, have recorded normal flows this month.

1.4 Groundwater levels

Compared to the LTA, at the end of February groundwater monitoring sites have shown a mixture of status from below normal in 3 sites, to exceptionally high at St. Mary's Church.

Compared to the end of January, at the end of February groundwater status has fallen at two monitoring sites. These include Rider Point in the north of the region, which has dropped from above normal in January to below normal in February, and Weir Farm in the west of the region, which dropped from notably high to above normal. The only site with an improvement in its status is Ram Hall, which moved from below normal to normal levels compared to the LTA.

1.5 Reservoir stocks

Compared to the LTA, 7 reservoirs have around average storage, 2 reservoirs have below average storage and 1 reservoir has above average storage. The 7 reservoirs with close to average storage are Clywedog, Vyrnwy, Draycote, Derwent, Carsington and Ogston, Elan and Blithfield. They have storage levels ranging between 84% - 92%, and are all within 4% of their LTA for the time of year.

By the end of February, the 2 reservoirs that had below average storage were the Dove, which has a storage percentage of 78%, and Tittesworth which was at 84% by month end. These sites are between 6-10% less than the LTA. Only Charnwood has above average storage levels for February at 98% full, which is 9% above the LTA.

By the end of February, Vyrnwy, Derwent, Tittesworth, Blithfield and Elan experienced a decrease in reservoir storage compared to the end of January. This is possibly due to the lack of rainfall in the Midlands during February resulting in the need for more reservoir releases to support river flows and public water supply.

1.6 Environmental impact

The West Midlands area has been in recovering drought status since 22 November 2022. East Midlands moved to recovering drought status as of 3 January 2023. We continue to work with water companies and other abstractors to manage water resources. We take precautionary actions to ensure the needs of water users and the environment are met. Where necessary restrictions have been imposed on abstractors or compensation schemes have been run.

1.7 River Severn operations

The River Severn is regulated to maintain a minimum flow at Bewdley gauging station. This ensures sufficient water flows along the river to support environmental and water supply requirements. River regulation is instigated when flows drop below a threshold. Regulation has not yet commenced for 2023. During 2022, the regulation season saw 114 days of river regulation which commenced on 20 May 2022.

1.8 River Wye operations

As of 6 March 2023, Elan storage is below the release control line, however flows at Redbrook remain above the regulation release threshold.

1.9 Water abstraction restrictions

As of 28 February 2023, there are 17 water abstraction licence restrictions in place across the Midlands, affecting 22 licences in total.

Table 1.2: Water abstraction licence restrictions

Area	Rivers and stations restricted
East Midlands	River Derwent at Derby St. Mary's and River Idle at Mattersey
West Midlands	Shropshire Middle Severn at Crudington, Rodington and Boreton Bridge, Staffordshire Trent Valley at Walcot, Worcestershire Middle Severn at Dowles Brook, Burlington Weir and Puxton and the Wye at Three Elms and Belmont.

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Disclaimer: 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 in this report.

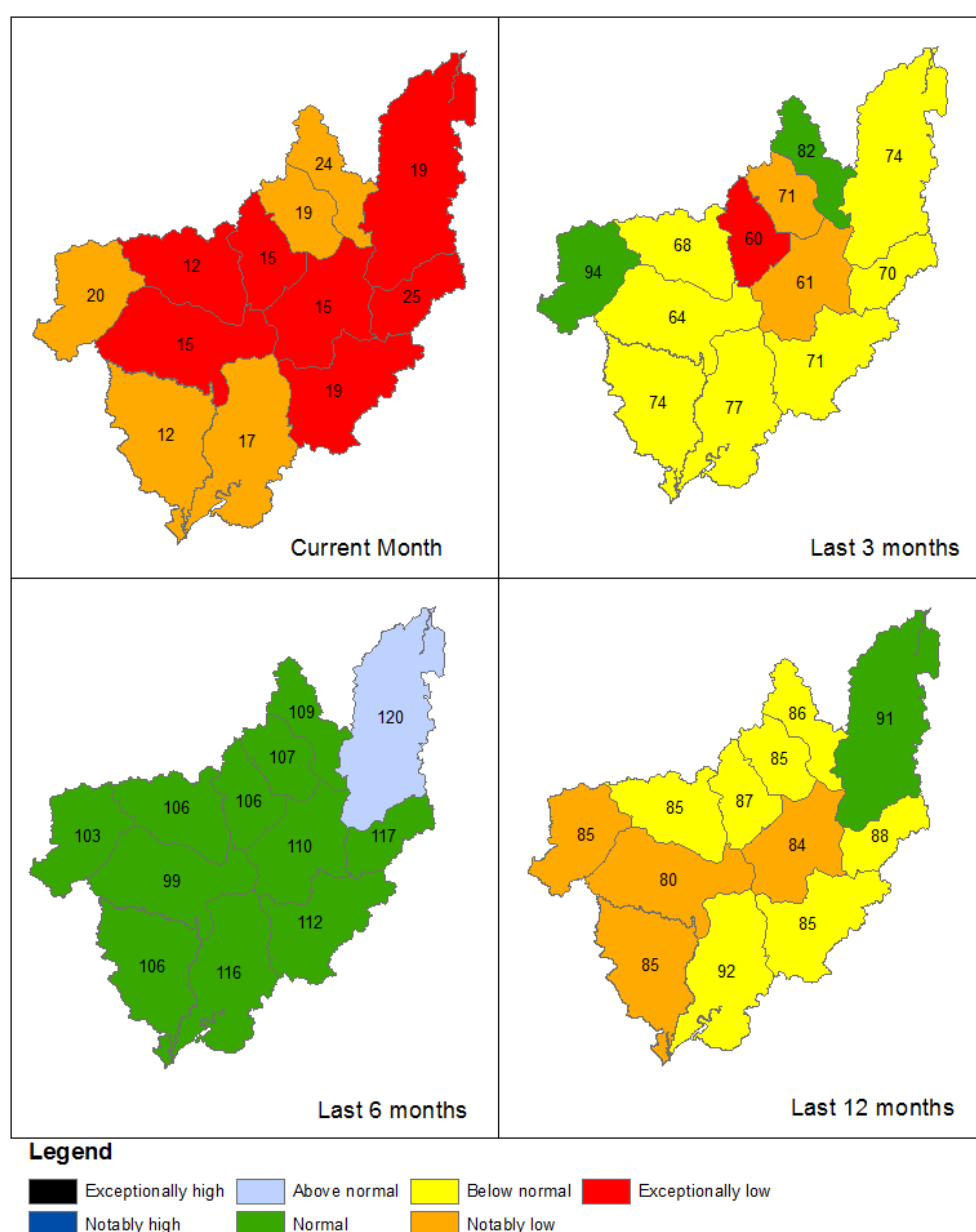
*[SMD]: soil moisture deficits

*[LTA]: long term average

2 Rainfall

2.1 Rainfall map

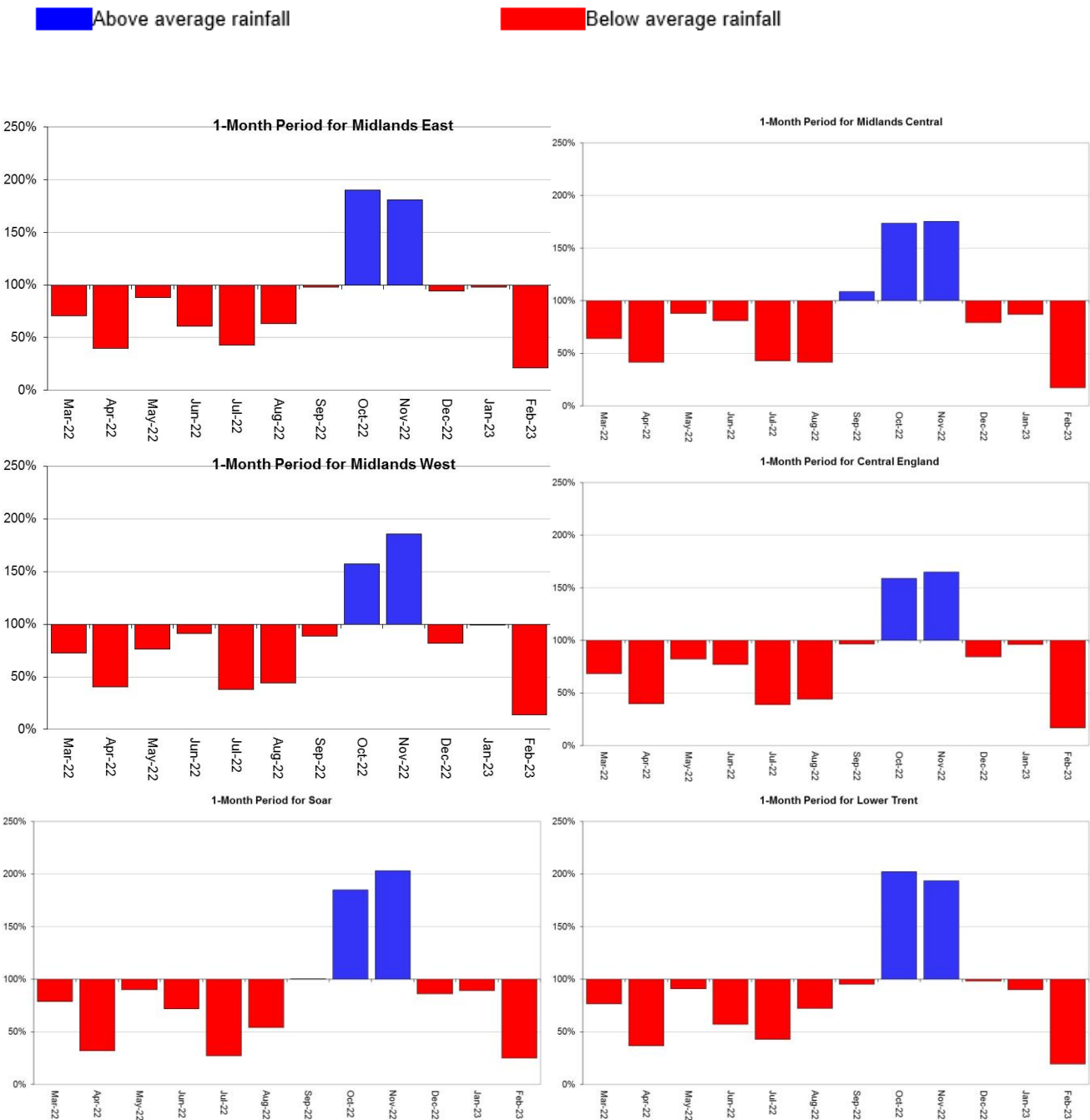
Figure 2.1: Total rainfall for hydrological areas for the current month (up to 28 February 2023), the last 3 months, the last 6 months, and the last 12 months, classed relative to an analysis of respective historic totals. Table available in the appendices with detailed information. Please see Section 7.4 for a map of the hydrological catchments for which rainfall is reported on.



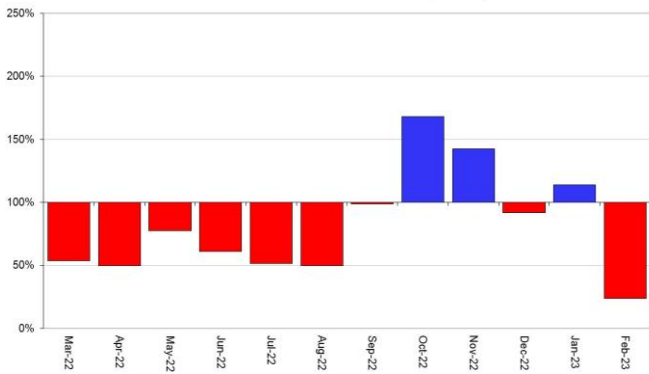
HadUK data based on the Met Office 1km gridded rainfall dataset derived from rain gauges (Source: Met Office. Crown copyright, 2023). Provisional data based on Environment Agency 1km gridded rainfall dataset derived from Environment Agency intensity rain gauges. Crown copyright. All rights reserved. Environment Agency, 100024198, 2023.

2.2 Rainfall charts

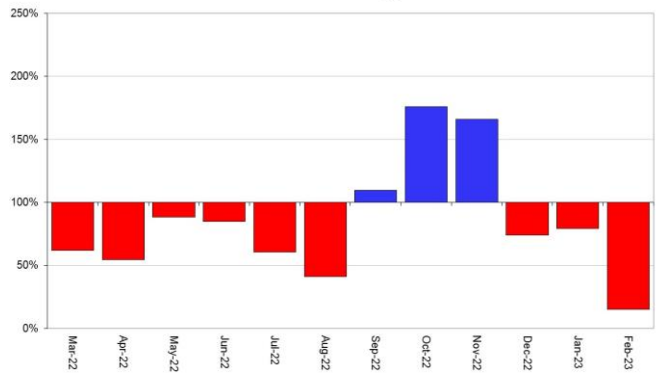
Figure 2.2: Monthly rainfall totals for the past 12 months as a percentage of the 1961 to 1990 long term average for each region and for England.



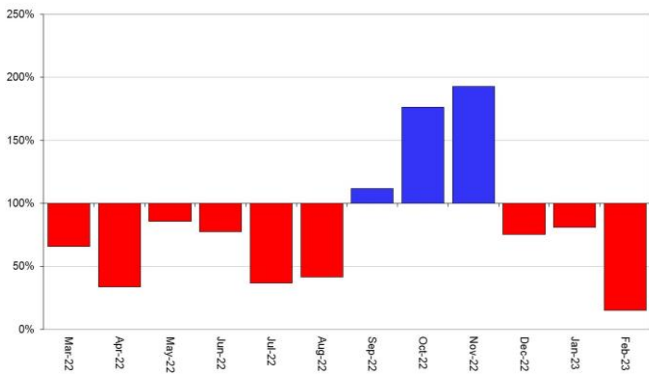
1-Month Period for Derwent (Midlands)



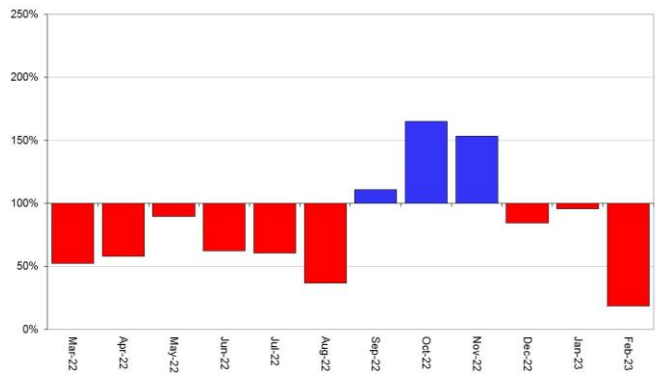
1-Month Period for Upper Trent



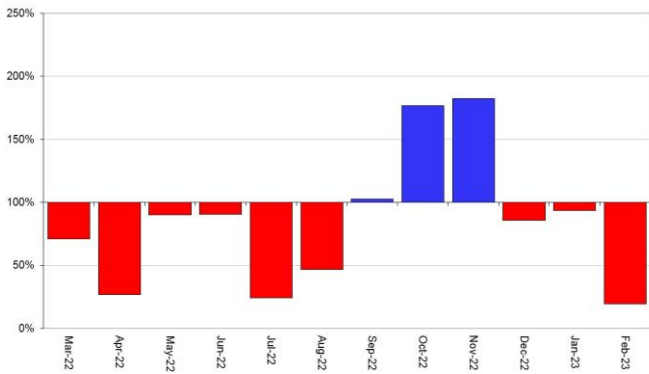
1-Month Period for Tame



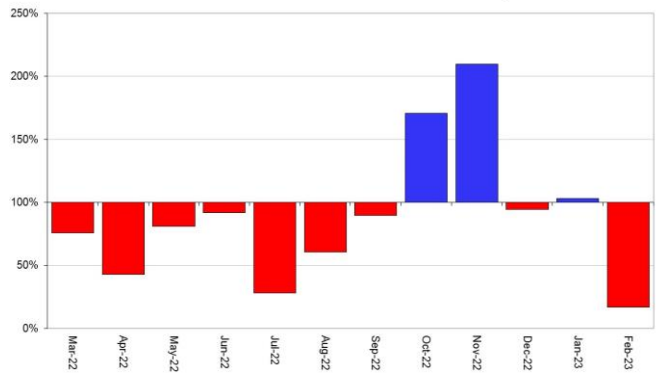
1-Month Period for Dove

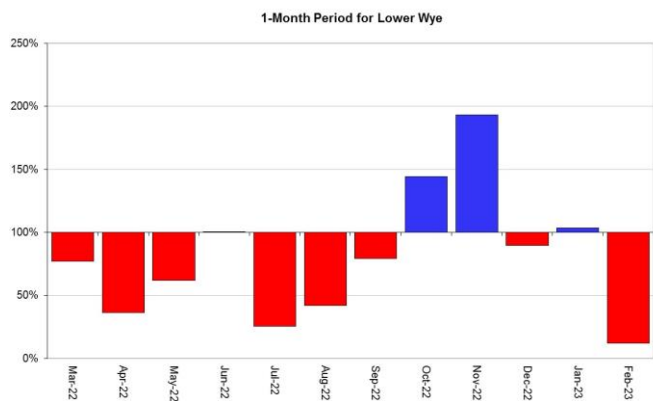
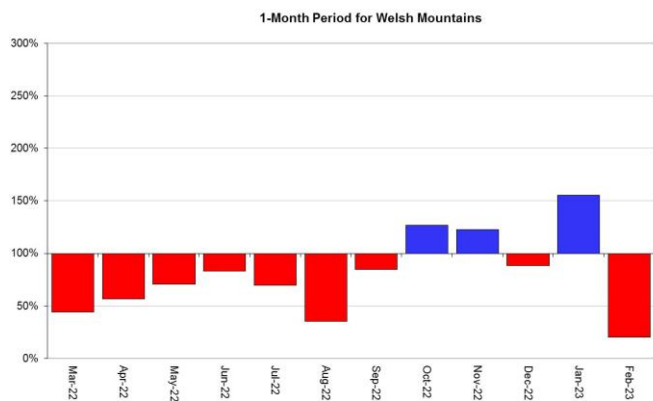
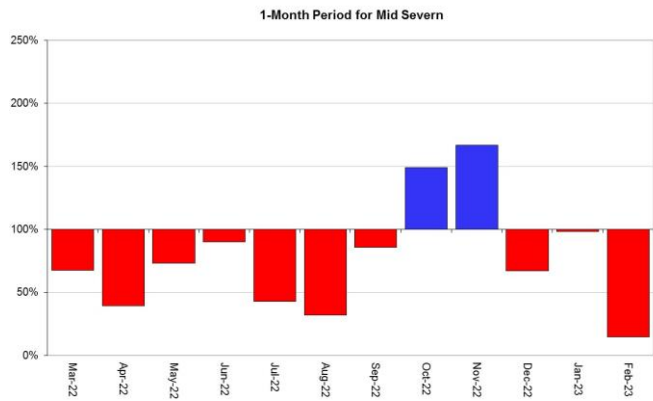
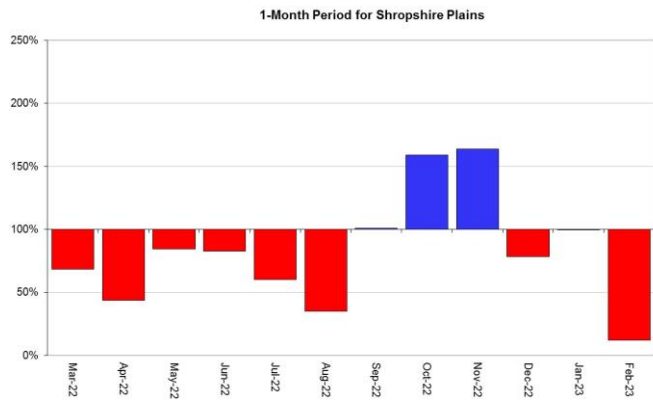


1-Month Period for Avon to Evesham



1-Month Period for Lower Severn Estuary



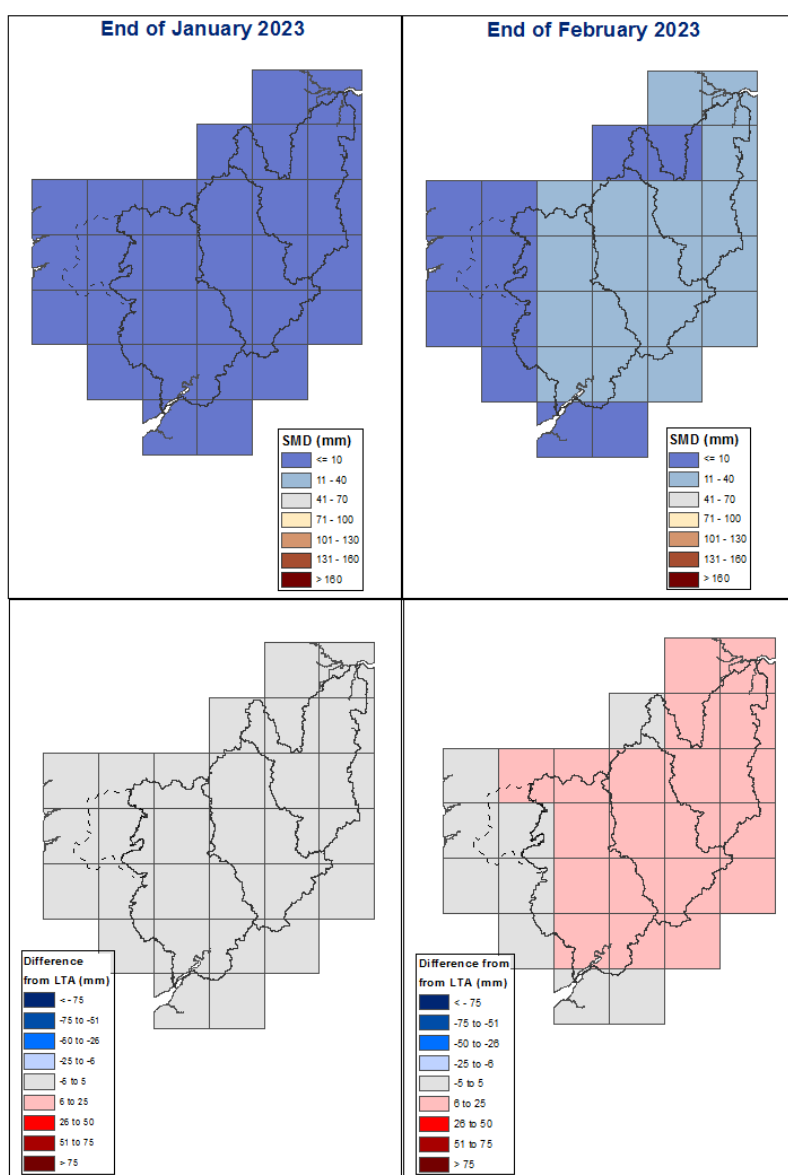


HadUK rainfall data. (Source: Met Office. Crown copyright, 2023).

3 Soil moisture deficit

3.1 Soil moisture deficit map

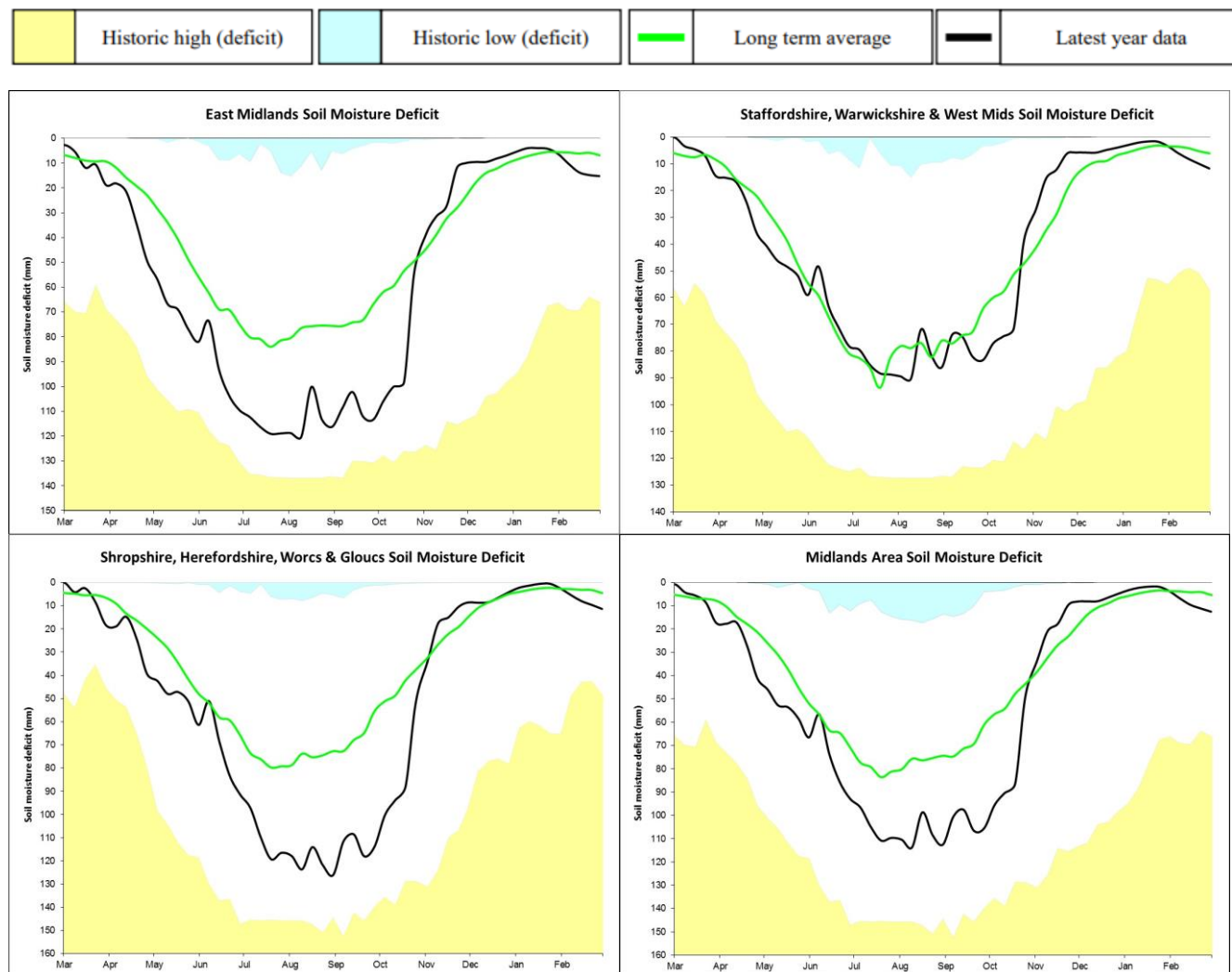
Figure 3.1: Soil moisture deficits for week ending 28 February 2023. Shows the difference (mm) of the actual soil moisture deficit from the 1961 to 1990 long term average soil moisture deficits. MORECS data for real land use.



(Source: Met Office. Crown copyright, 2023). All rights reserved. Environment Agency, 100024198, 2023.

3.2 Soil moisture deficit charts

Figure 3.2: Latest soil moisture deficit charts for selected areas across the Midlands.

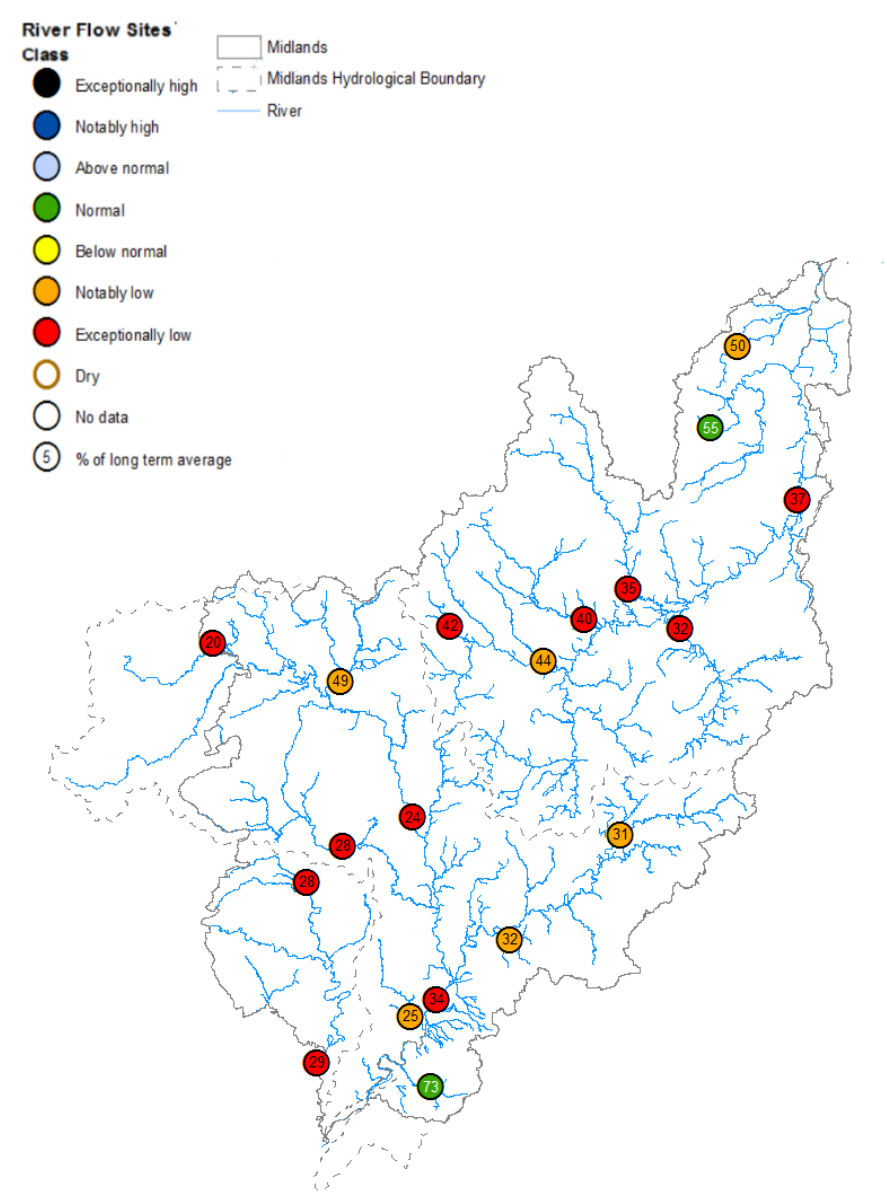


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4 River flows

4.1 River flows map

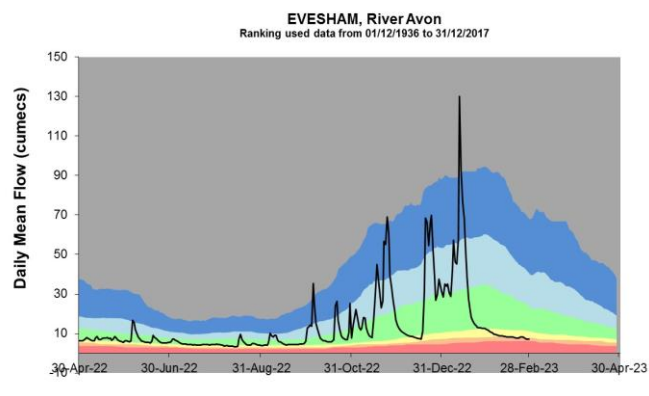
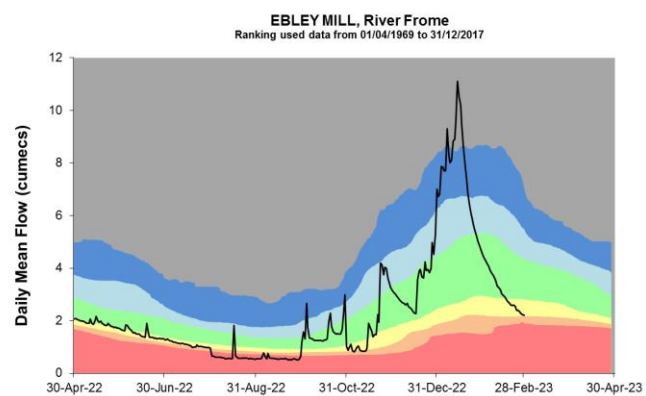
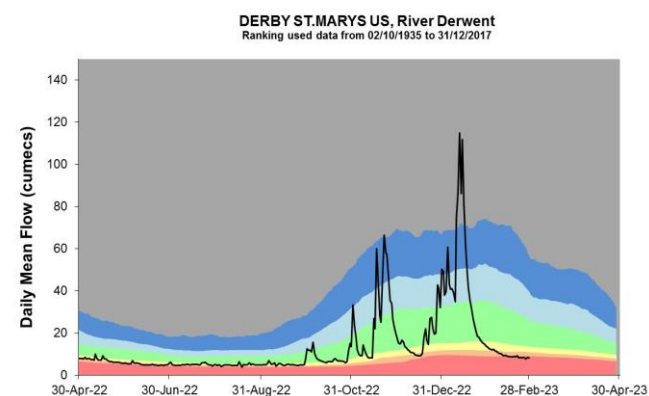
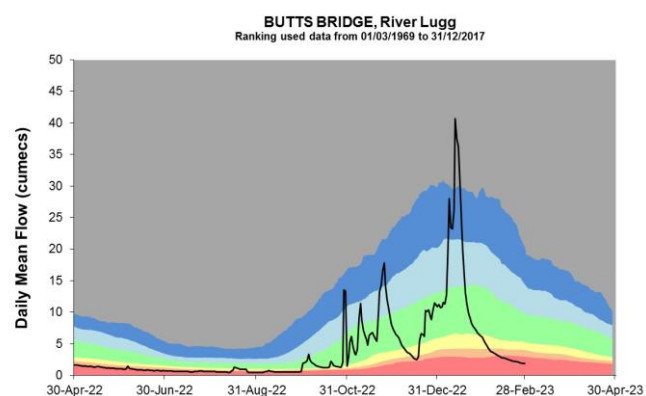
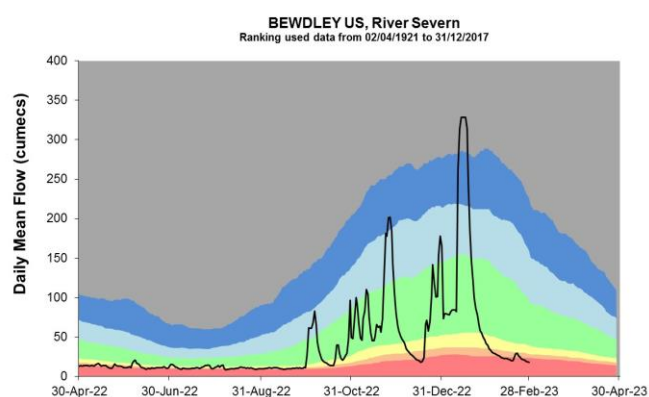
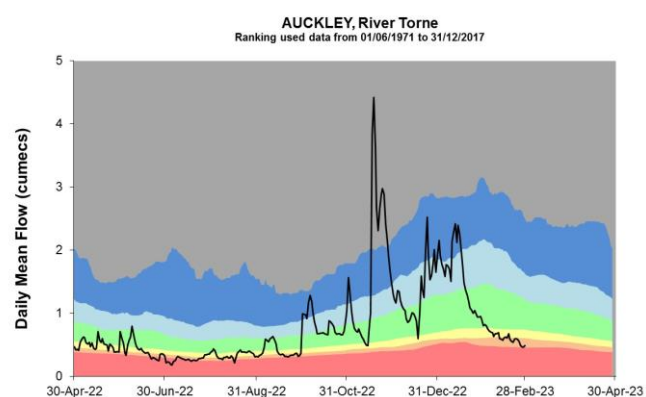
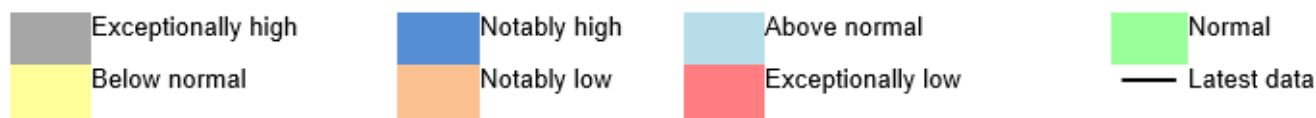
Figure 4.1: Monthly mean river flow for indicator sites for February 2023, expressed as a percentage of the respective long term average and classed relative to an analysis of historic February monthly means. Table available in the appendices with detailed information.



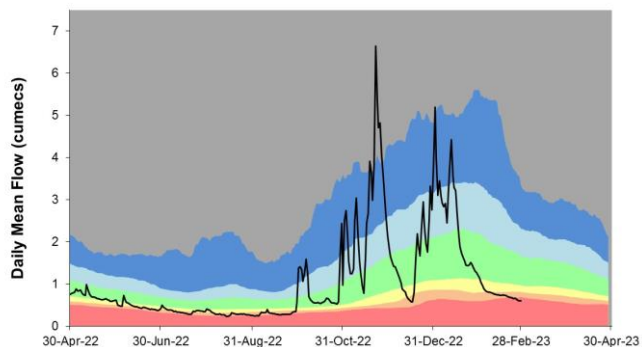
(Source: Environment Agency). Crown copyright. All rights reserved. Environment Agency, 100024198, 2023.

4.2 River flow charts

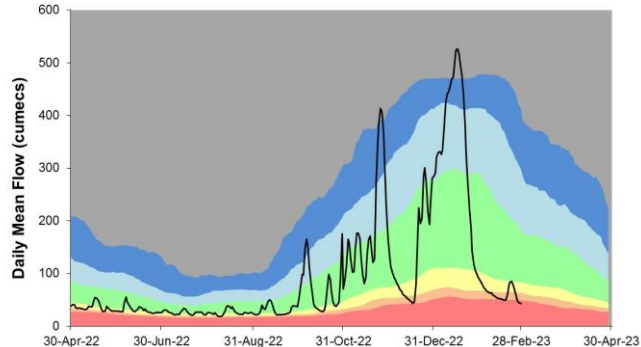
Figure 4.2: Daily mean river flow for index sites over the past 10 months, compared to an analysis of historic daily mean flows.



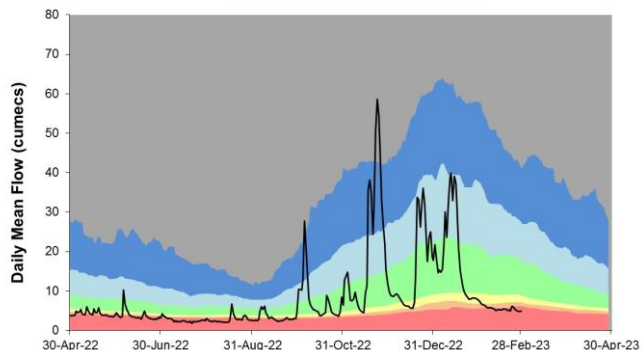
GREAT BRIDGFORD, River Sow
Ranking used data from 18/01/1971 to 31/12/2017



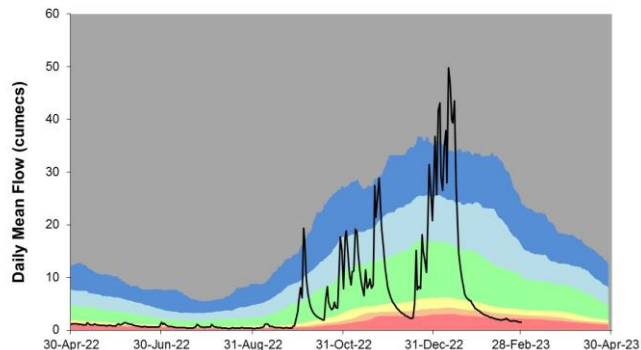
HAW BRIDGE, River Severn
Ranking used data from 01/07/1971 to 31/12/2017



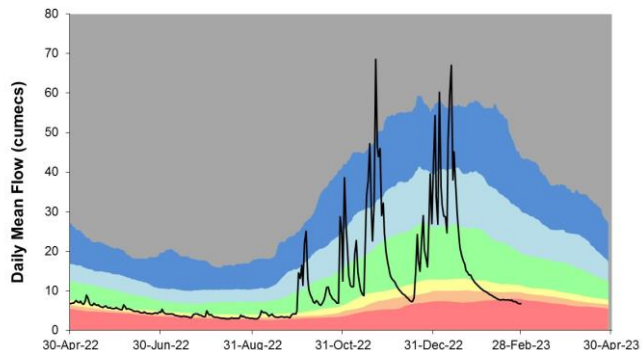
KEGWORTH US, River Soar
Ranking used data from 01/12/1978 to 31/12/2017



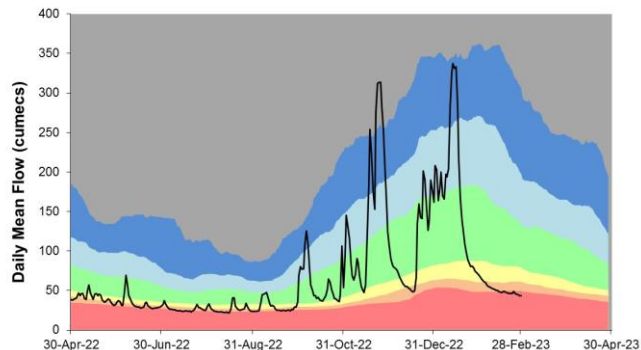
LLANYBLDWEL, Afon Tanat
Ranking used data from 01/06/1973 to 31/12/2017



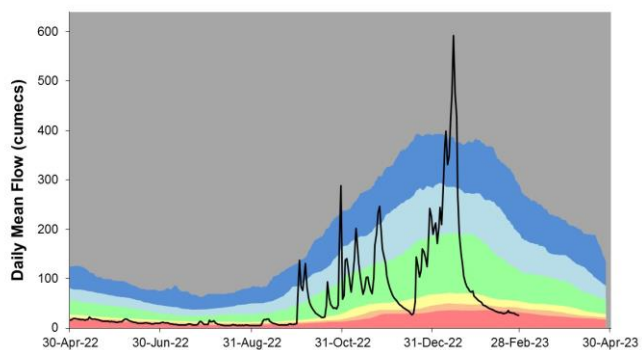
MARSTON ON DOVE, River Dove
Ranking used data from 01/07/1965 to 31/12/2017



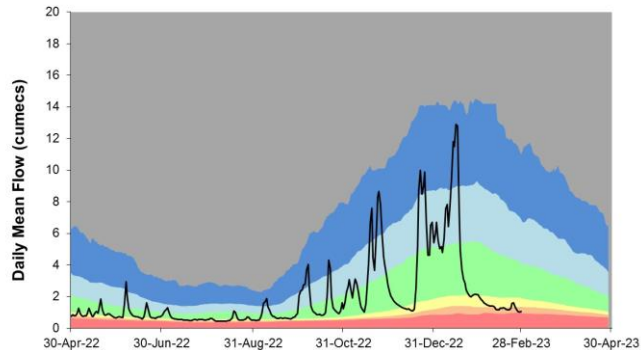
NORTH MUSKHAM, River Trent
Ranking used data from 31/10/1969 to 31/12/2017

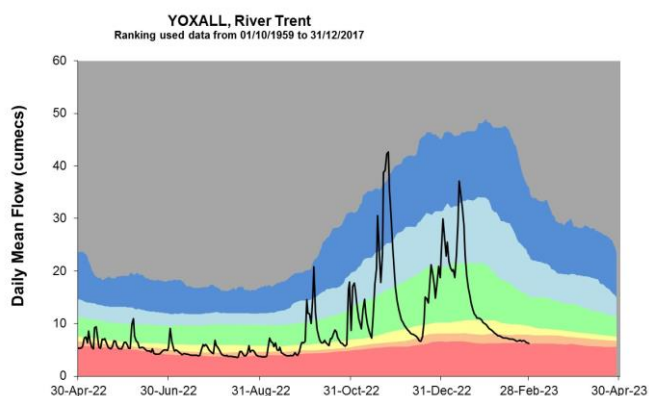
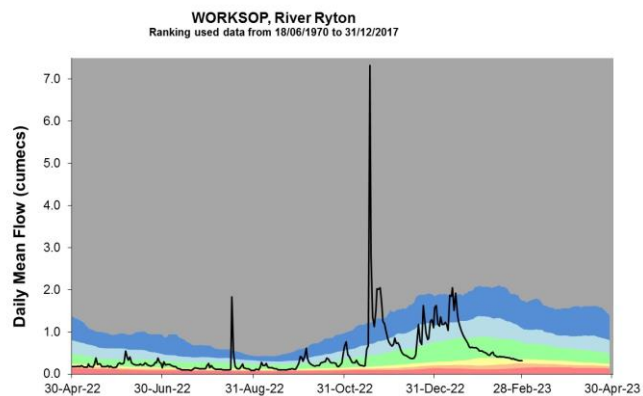
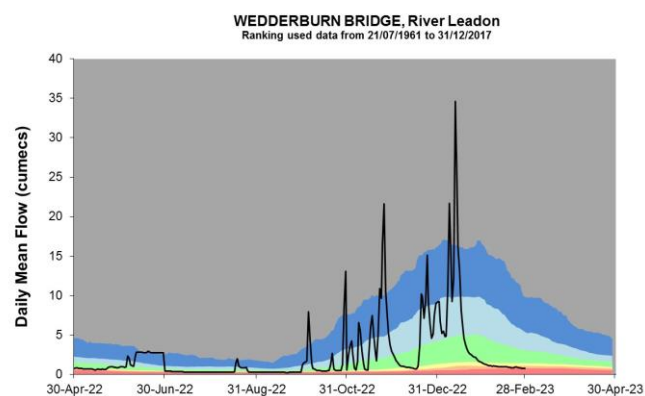
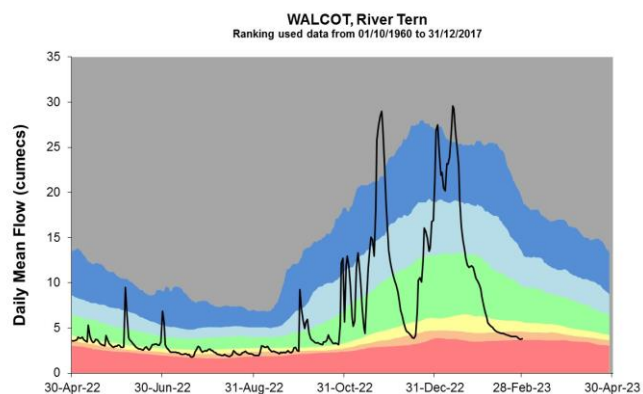
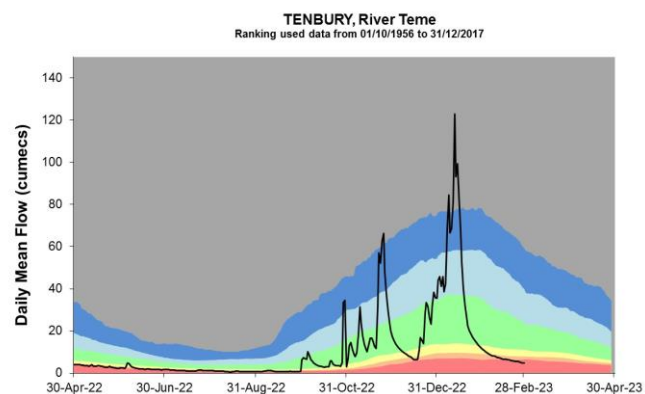


REDBROOK, River Wye
Ranking used data from 01/10/1969 to 31/12/2017



STARETON, River Avon
Ranking used data from 01/10/1962 to 31/12/2017



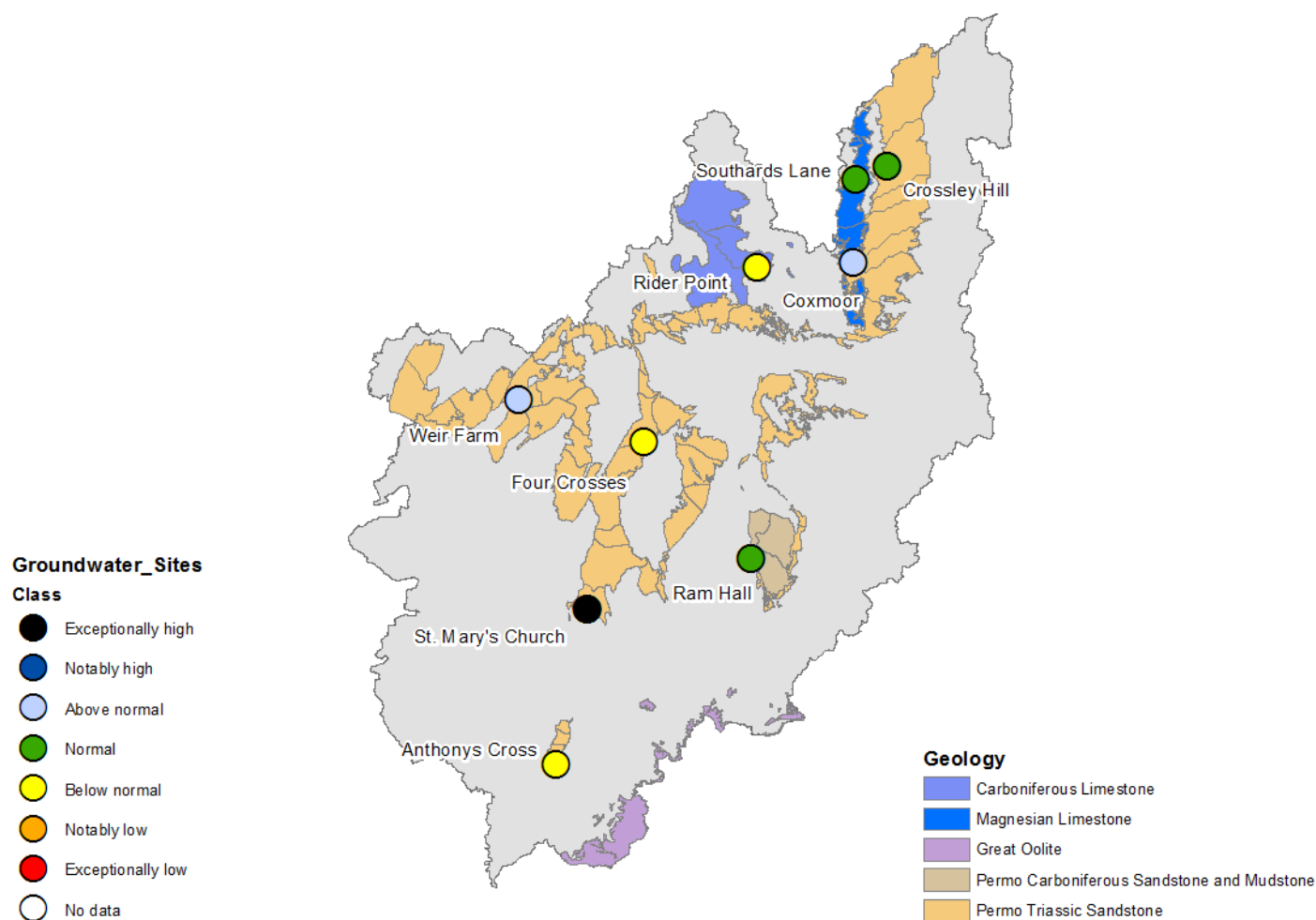


Source: Environment Agency.

5 Groundwater levels

5.1 Groundwater levels map

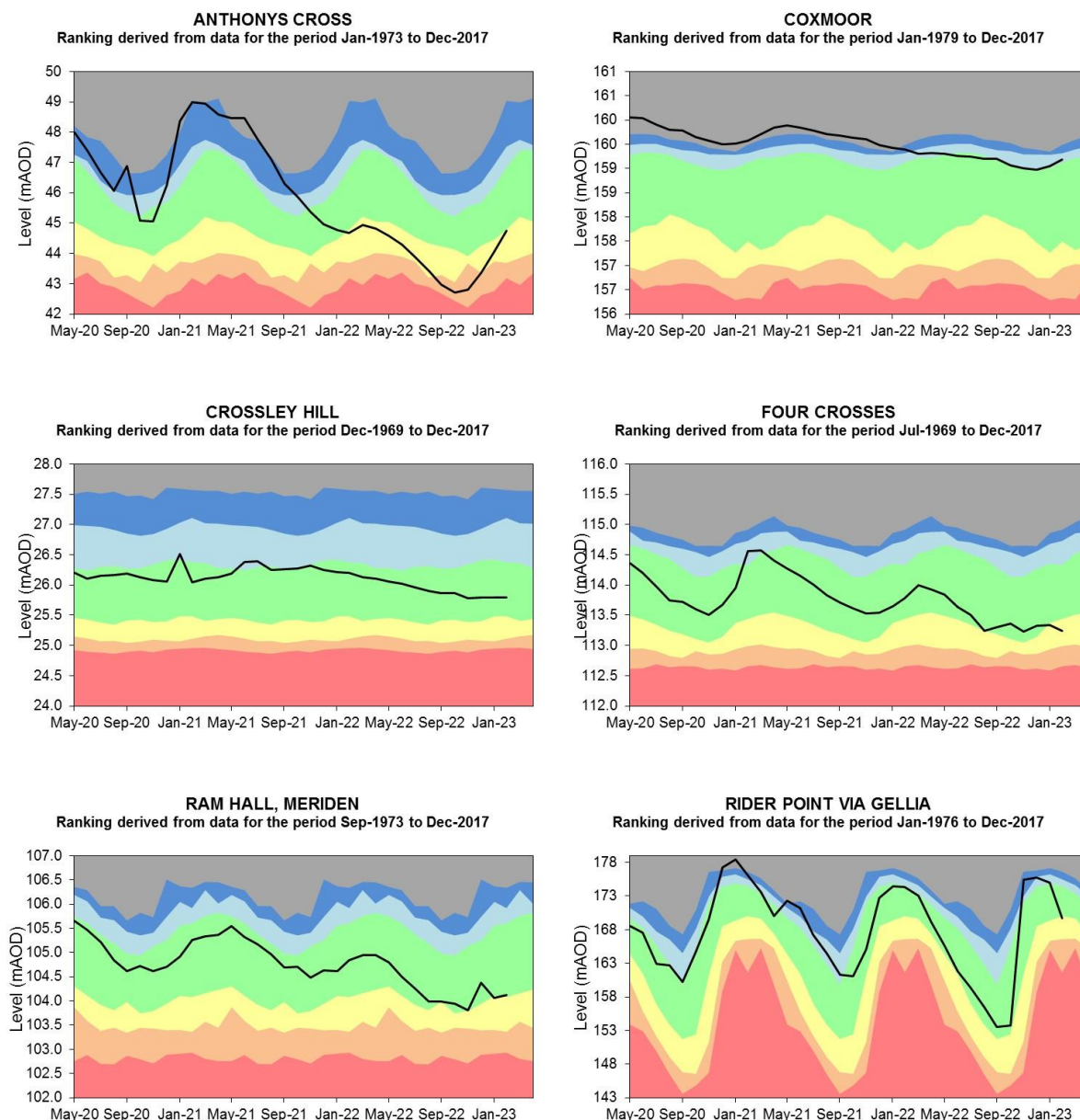
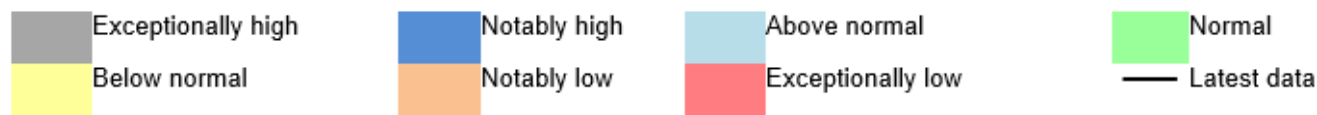
Figure 5.1: Groundwater levels for indicator sites at the end of February 2023, classed relative to an analysis of respective historic February levels. Table available in the appendices with detailed information.



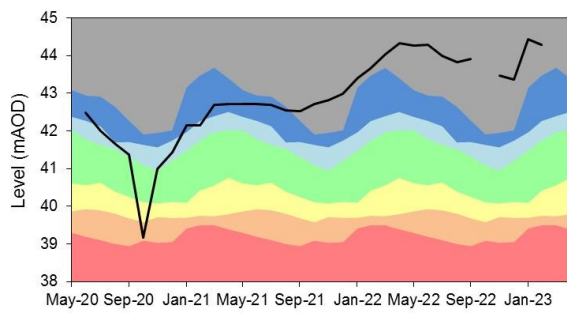
(Source: Environment Agency). Geological map reproduced with kind permission from UK Groundwater Forum, BGS copyright NERC. Crown copyright. All rights reserved. Environment Agency, 100024198, 2023.

5.2 Groundwater level charts

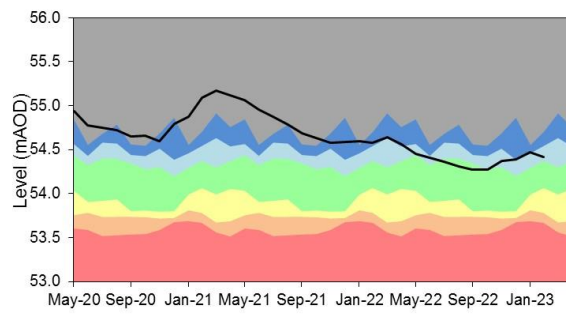
Figure 5.2: End of month groundwater levels at index groundwater level sites for major aquifers. 34 months compared to an analysis of historic end of month levels.



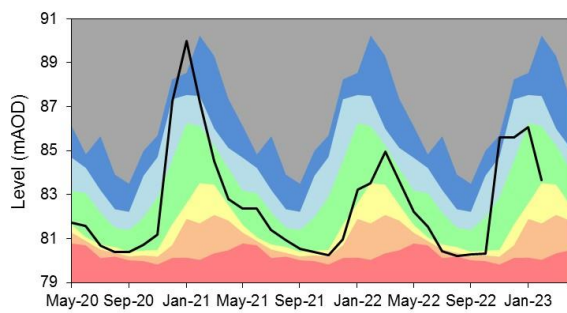
ST MARYS CHURCH SHRA
Ranking derived from data for the period Oct-1974 to Dec-2017



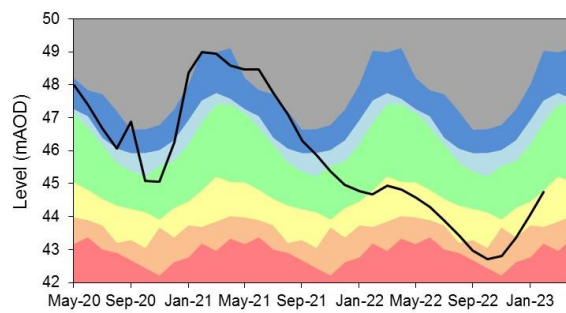
WEIR FARM OBS - 143
Ranking derived from data for the period Feb-1983 to Dec-2017



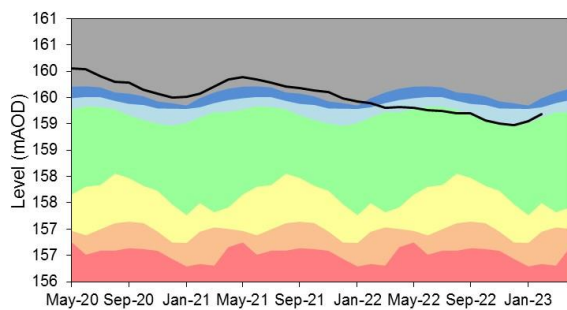
SOUTHARDS LANE, BOLSOVER
Ranking derived from data for the period Jan-1973 to Dec-2017



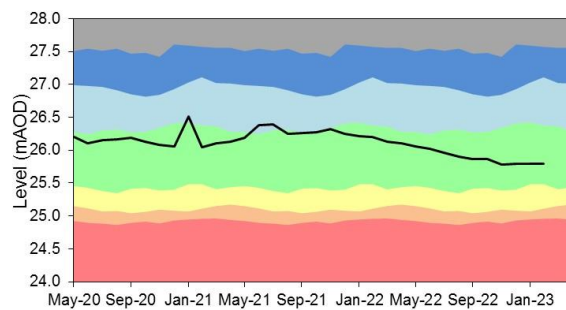
ANTHONY'S CROSS
Ranking derived from data for the period Jan-1973 to Dec-2017



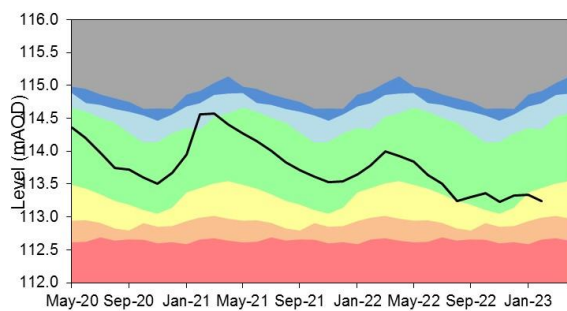
COXMOOR
Ranking derived from data for the period Jan-1979 to Dec-2017



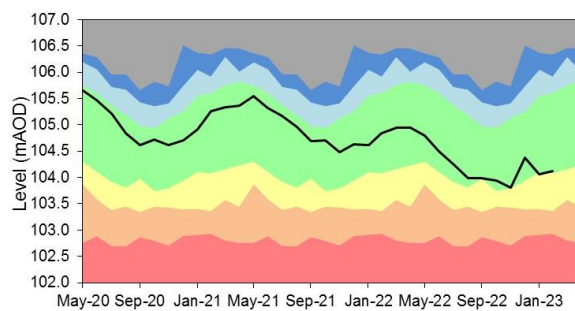
CROSSLEY HILL
Ranking derived from data for the period Dec-1969 to Dec-2017

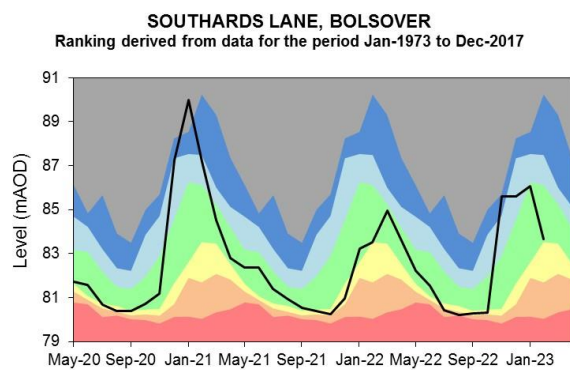
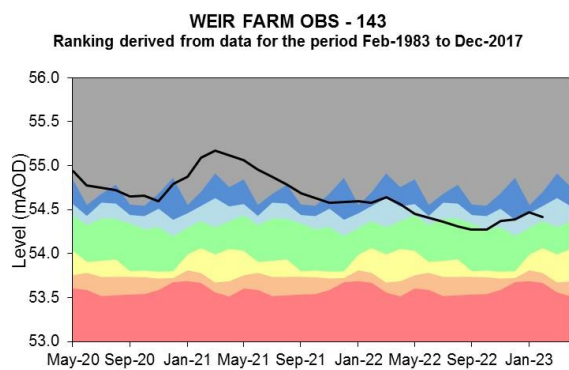
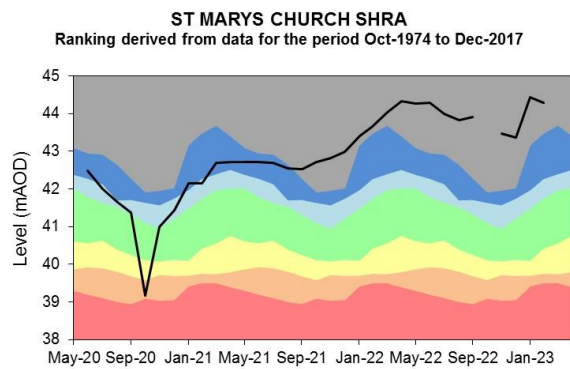
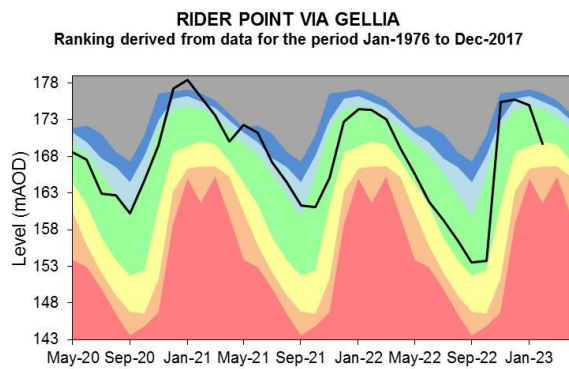


FOUR CROSSES
Ranking derived from data for the period Jul-1969 to Dec-2017



RAM HALL, MERIDEN
Ranking derived from data for the period Sep-1973 to Dec-2017

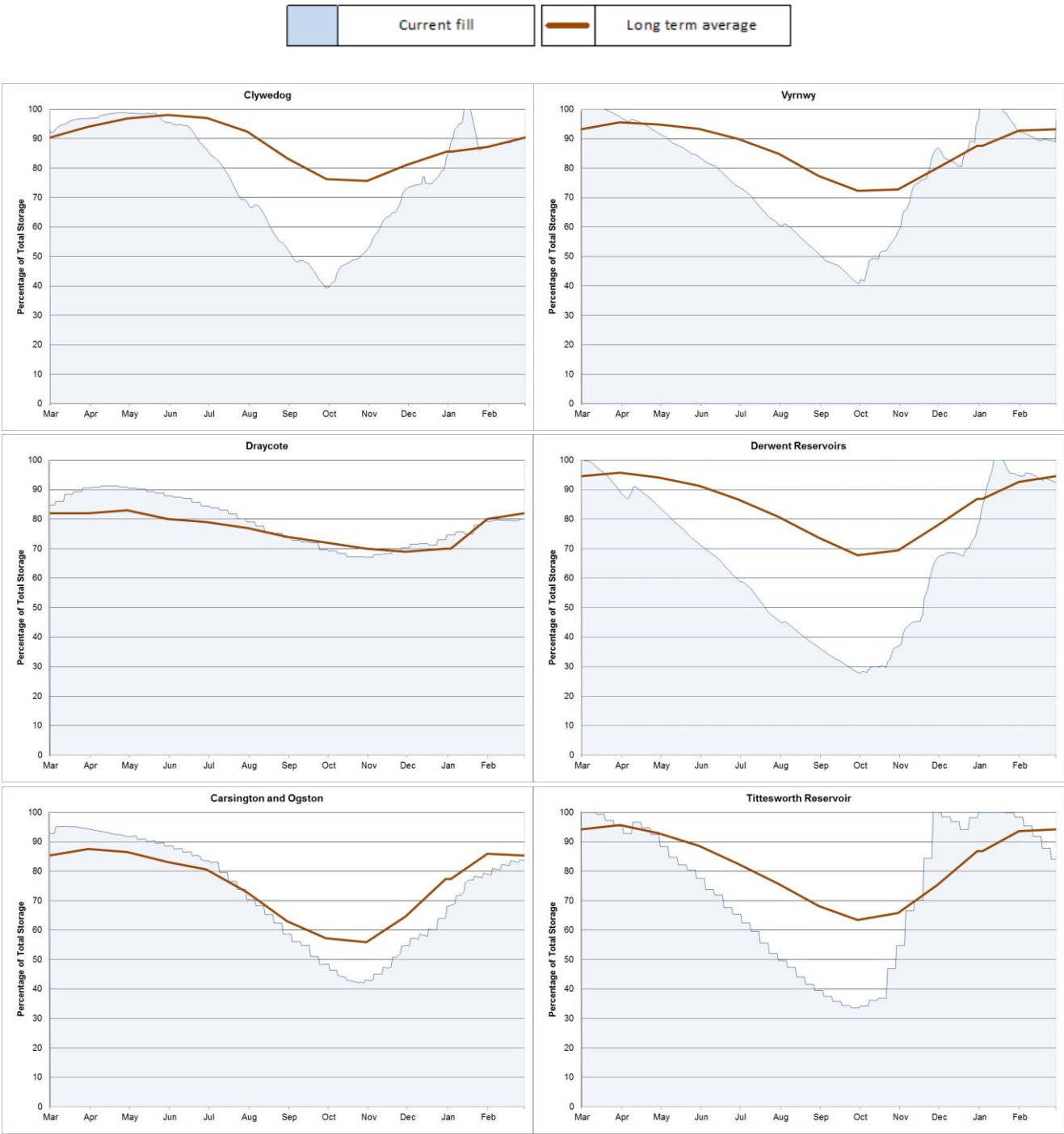


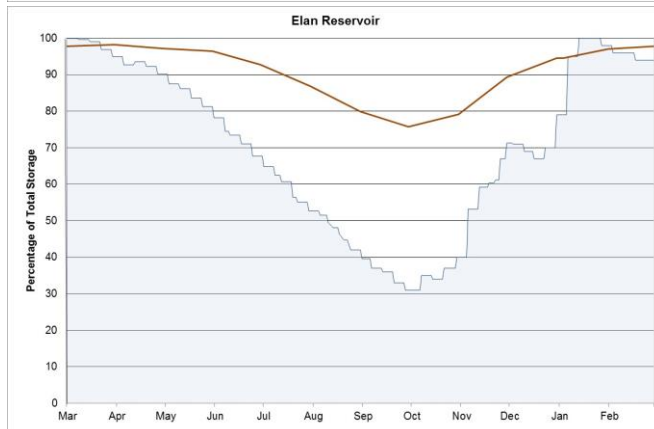
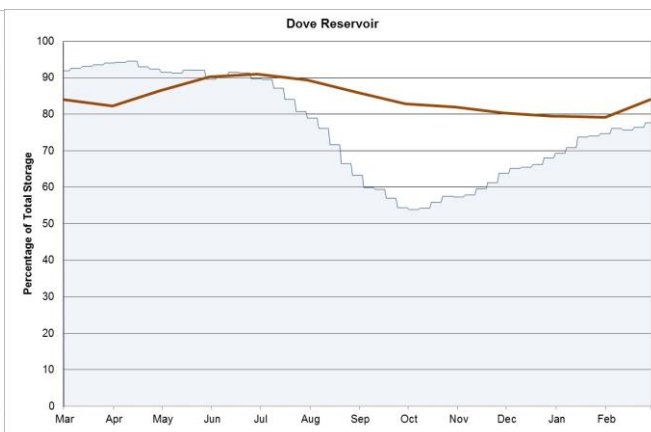
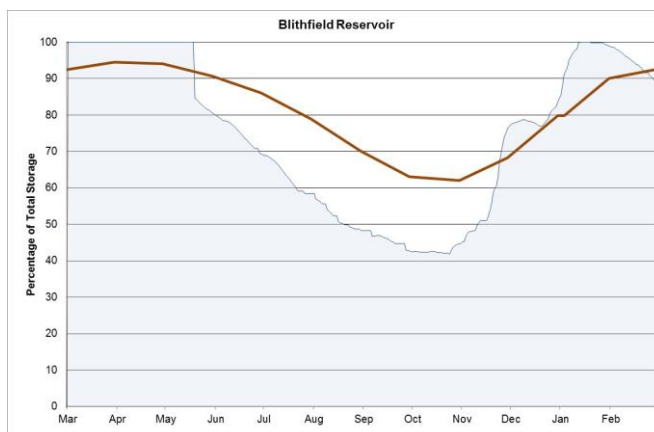


Source: Environment Agency, 2023.

6 Reservoir stocks

Figure 6.1: End of month regional reservoir stocks compared to long term average stocks.
Note: Historic records of individual reservoirs and reservoir groups making up the regional values vary in length. Please see Section 7.5 for a map detailing the locality of the Midlands reservoirs reported on.





(Source: water companies).

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

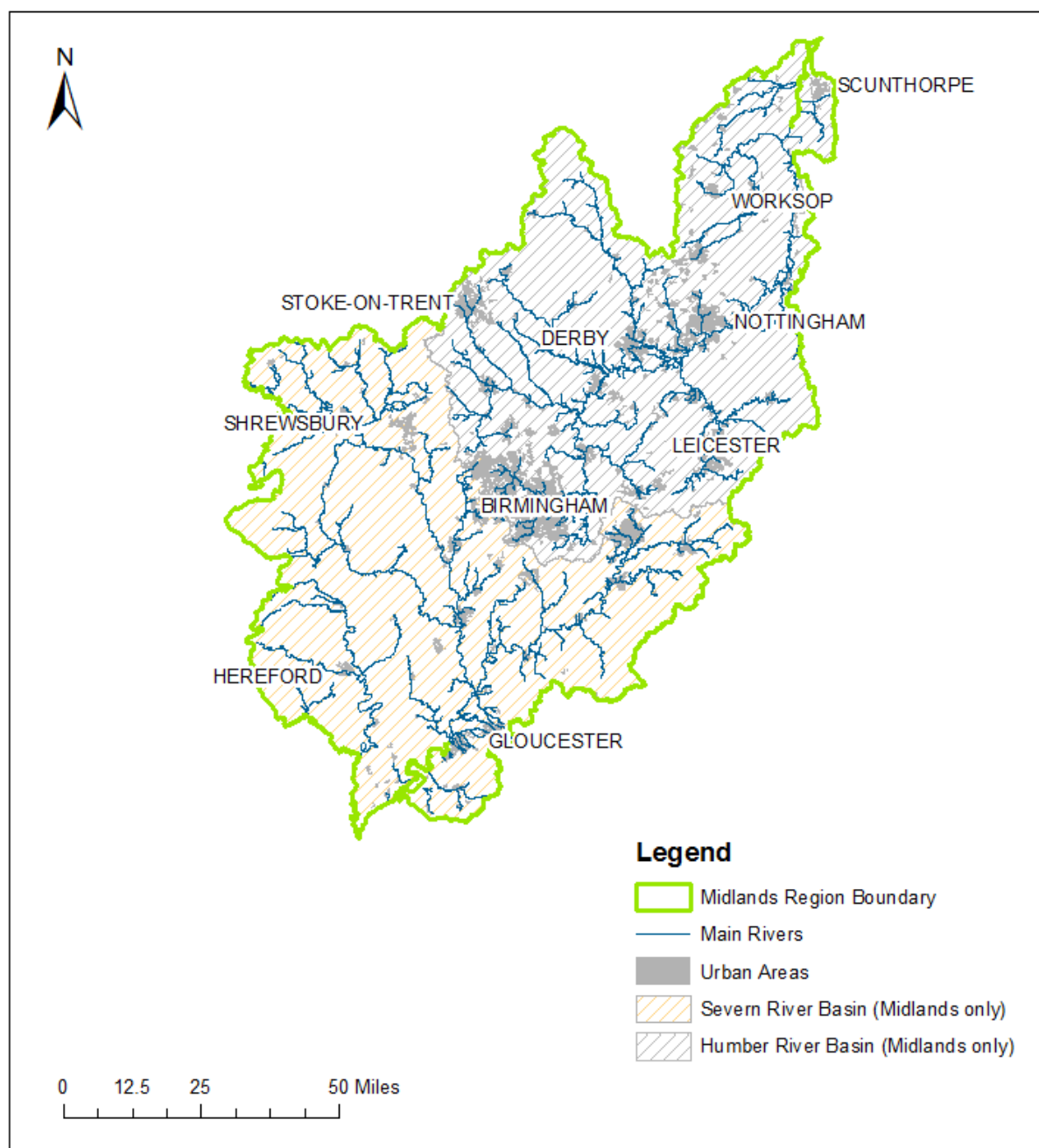
Value likely to fall within this band 8% of the time.

Exceptionally low

Value likely to fall within this band 5% of the time.

7.3 Midlands regional coverage

Figure 7.1: The Midlands regional boundary and the hydrological boundaries of the River Severn and River Trent.



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7.4 Midlands hydrological areas

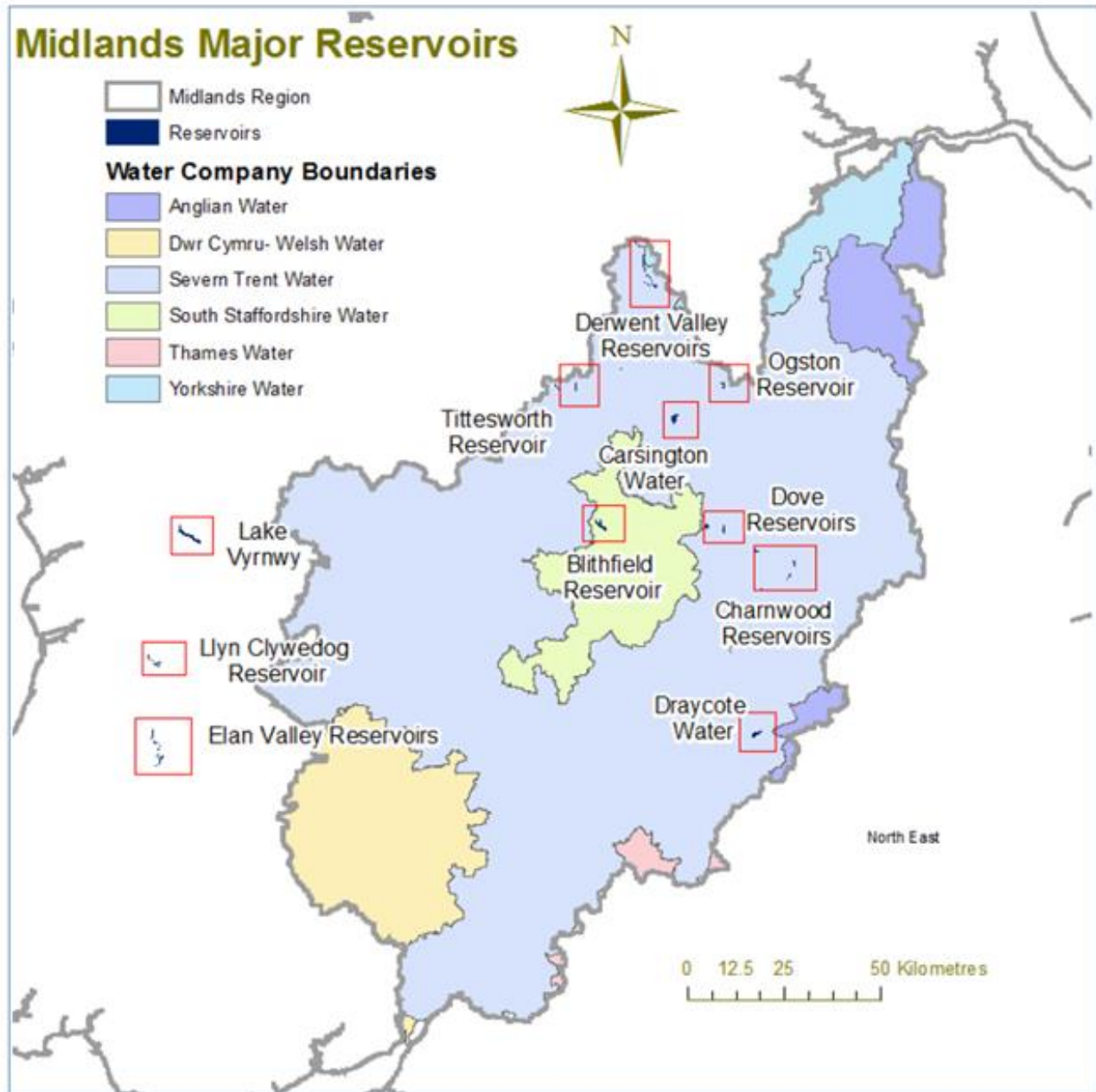
Figure 7.2: The 12 hydrological areas that make up the Midlands region. Natural Resources Wales are not currently producing a monthly water situation report.



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7.5 Midlands major reservoirs

Figure 7.3: Location of major reservoirs in the Midlands.



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8 Appendices

8.1 Rainfall table

Hydrological area	Feb 2023 rainfall % of long term average 1961 to 1990	Feb 2023 band	Dec 2022 to February cumulative band	Sep 2022 to February cumulative band	Mar 2022 to February cumulative band
Avon To Evesham	19	Exceptionally low	Below normal	Normal	Below normal
Derwent (midlands)	24	Notably low	Normal	Normal	Below normal
Dove	19	Notably low	Notably low	Normal	Below normal
Lower Severn Estuary	17	Notably low	Below normal	Normal	Below normal
Lower Trent	19	Exceptionally low	Below normal	Above normal	Normal
Lower Wye	12	Notably low	Below normal	Normal	Notably low
Mid Severn	15	Exceptionally low	Below normal	Normal	Notably low
Shropshire Plains	12	Exceptionally low	Below normal	Normal	Below normal
Soar	25	Exceptionally low	Below normal	Normal	Below normal
Tame	15	Exceptionally low	Notably low	Normal	Notably low

Upper Trent	15	Exceptionally low	Exceptionally low	Normal	Below normal
Welsh Mountains	20	Notably low	Normal	Normal	Notably low

8.2 River flows table

Site name	River	Catchment	Feb 2023 band	Jan 2023 band
Auckley	Torne	Torne	Notably low	Normal
Bewdley Us	Severn	Severn Lower Mid	Exceptionally low	Above normal
Butts Bridge	Lugg	Lugg	Exceptionally low	Above normal
Derby St.Mary's Us	Derwent (mi)	Derwent Der to Markeaton con	Exceptionally low	Notably high
Ebley Mill	Frome (glos)	Frome Gloucs	Normal	Exceptionally high
Evesham	Avon (mi)	Avon Warwks Lower	Notably low	Normal
Great Bridgford	Sow	Sow Upper	Exceptionally low	Normal
Haw Bridge	Severn	Severn Lower	Exceptionally low	Above normal
Kegworth Us	Soar	Soar to Kingston Brook confl	Exceptionally low	Normal
Llanyblodwel	Tanat	Severn Upper River Tanat	Exceptionally low	Notably high
Marston On Dove	Dove (mi)	Dove Derb to Hilton Br confl	Exceptionally low	Above normal

North Muskham	Trent	Trent to Cromwell	Exceptionally low	Normal
Stareton	Avon (mi)	Avon Warwks Upper	Notably low	Normal
Tenbury	Teme	Teme	Exceptionally low	Above normal
Walcot	Tern	Tern	Notably low	Notably high
Wedderburn Bridge	Leadon	Leadon	Notably low	Above normal
Worksop	Ryton	Ryton Upper to Oldcoates Dyke	Normal	Above normal
Yoxall	Trent	Trent to Tame Mease confl	Notably low	Normal
Redbrook	Wye (Herefordshire)	Wye H and W d s Lugg	Exceptionally low	Above normal

8.3 Groundwater table

Site name	Aquifer	End of Feb 2023 band	End of Jan 2023 band
Anthony's Cross	Permo Triassic Sandstone	Below normal	Below normal
Coxmoor	Permo Triassic Sandstone	Above normal	Above normal
Crossley Hill	Permo Triassic Sandstone	Normal	Normal
Four Crosses	Grimsby Ancholme Louth Limestone	Below normal	Below normal
Ram Hall, Meriden	Grimsby Ancholme Louth Limestone	Normal	Below normal
Rider Point Via Gellia	Carboniferous Limestone	Below normal	Above normal
Southards Lane, Bolsover	Magnesian Limestone	Normal	Normal
St Marys Church, Shrawley	East Shropshire Permo-triassic Sandstone	Exceptionally high	Exceptionally high
Weir Farm	Bridgnorth Sandstone Formation	Above normal	Notably high