

# Monthly water situation report: Midlands

## 1 Summary - October 2022

**Rainfall** – Following the dry spring and summer across the Midlands, rainfall received in October in all except one hydrological area (Welsh Mountains) was ‘Above normal’ or ‘Notably high’ compared to long-term average (LTA).

**Soil Moisture Deficit** – As a result of the wet October, by the end of month soil moisture deficit across the Midlands area was lower than the LTA.

**River Flows** – Compared to the LTA, river flow levels recovered to ‘Normal’ at majority of monitoring sites. Two sites recorded ‘Exceptionally low’, one site reported ‘Notably low’ and two other sites recorded ‘Below normal’.

**Groundwater Levels** – Groundwater levels vary across the Midlands area and compared to LTA majority of the sites remain at ‘Normal’ level or higher.

**Reservoir Storage** – By the end of October all reservoirs had increased their storage levels; however, the levels remained lower than the LTA with storage levels varying in the range of 30-70% across the reservoirs.

### 1.1 Rainfall

After the dry months of spring and summer and below long-term average (LTA) rainfalls, by the end of October rainfall received in all hydrological across the Midlands was ‘Above normal’ or ‘Notably high’. The exception was Welsh Mountains that recorded ‘Normal’. Derwent, Lower Trent, Upper Trent and Tame were the hydrological areas to receive ‘Notably high’ rainfall compared to LTA.

### 1.2 Soil moisture deficit and recharge

Due to the rainfall received during October soil moisture deficit decreased to a notable extent compared to September and previous months. By the end of October soil moisture deficit was lower than LTA across different parts of the Midlands (Figure 3.2).

### 1.3 River flows

Rivers reacted to the rainfalls received in October to recover to ‘Normal’ status at majority of monitoring sites compared to the LTA. The sites reporting lower than normal status are in South-west of the Midlands area. They include Ebley Mill and Butts Bridge as ‘Exceptionally low’, Tenbury as ‘Notably low’ and Bewdley and Redbrook as ‘Below normal’.

## 1.4 Groundwater levels

By the end of October, majority of the groundwater monitoring sites across the Midlands area recorded 'Normal' levels or higher, compared to the LTA. Anthony's Cross (West Midlands, Permo Triassic Sandstone) measured 'Notably Low' groundwater levels at the end of October, whilst Southards Lane (East Midlands, Magnesian Limestone) measured 'Below Normal'.

## 1.5 Reservoir stocks

By the end of October all reservoirs had increased their storage levels; however, the levels remained lower than the LTA with storage levels varying in the range of 30-70% across the reservoirs. Compared to LTA, greatest deficits are seen in Elan and Derwent reservoirs with a magnitude of 40% and 33% respectively. Storage levels at Draycote were very close to the October LTA.

## 1.6 Environmental impact

East Midlands Area moved to drought incident status on 12-08-2022 whilst West Midlands moved on 23-08-2022. We continue to work with water companies and other abstractors to manage water resources and 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. Also regular monitoring of the water environments have been carried out.

## 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. Regulation is instigated when flows drop below a threshold.

Following the issuing of a regulation alert in April, River Severn regulation began on the 20-05-2022, and has operated for a total of 114 days, as of 06-10-2022. Operation of the Shropshire Groundwater Scheme began on 21-06-2022. Following the September rainfall, regulation was rested on 29-09-2022.

Table 1.1: River Severn operational releases

Water supply (MI/d)	Total releases	Normal releases	Regulation releases	Flood drawdown releases
Llyn Clywedog	18	18	0	0

Lake Vyrnwy	85	45	40	0
Shropshire Groundwater Scheme	137	0	137	0

## 1.8 River Wye operations

As of 08-11-2022 River Wye regulation continues - Elan storage is below the release control line and flows at Redbrook remain below the regulation threshold.

## 1.9 Water abstraction restrictions

As of 08-11-2022 there are 4 water abstraction licence restrictions in place across the Midlands. Please see the table on the next page for more information.

Table 1.2: Water abstraction licence restrictions

Area	Rivers and stations restricted
East Midlands	No restriction in place.
West Midlands	Perry (Yeaton), Roden (Rodington), Mor Brook (Oak Cottage), Stour (Puxton)

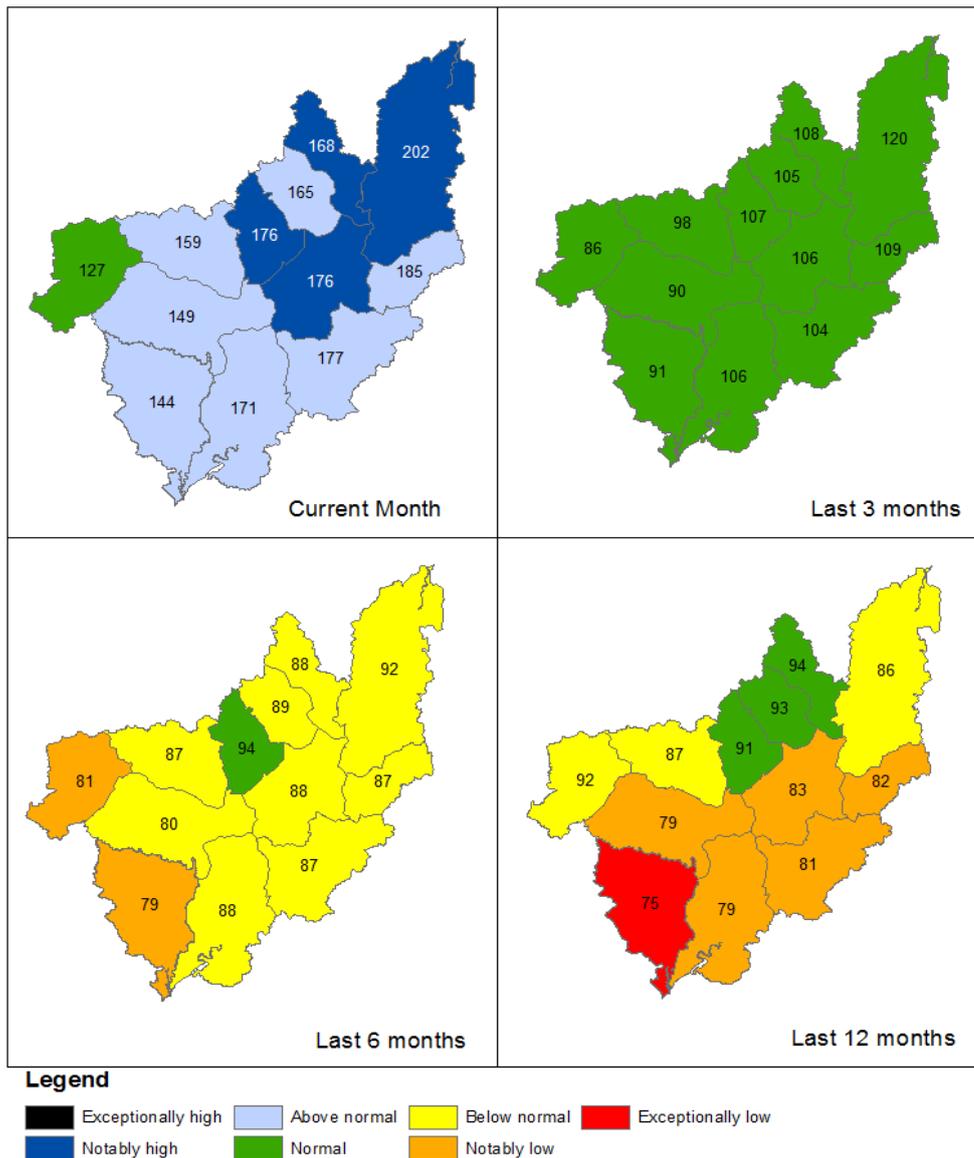
Author: Midlands Hydrology, [midlandshydrology@environment-agency.gov.uk](mailto:midlandshydrology@environment-agency.gov.uk)

Contact Details: 03708 506 506

## 2 Rainfall

### 2.1 Rainfall map

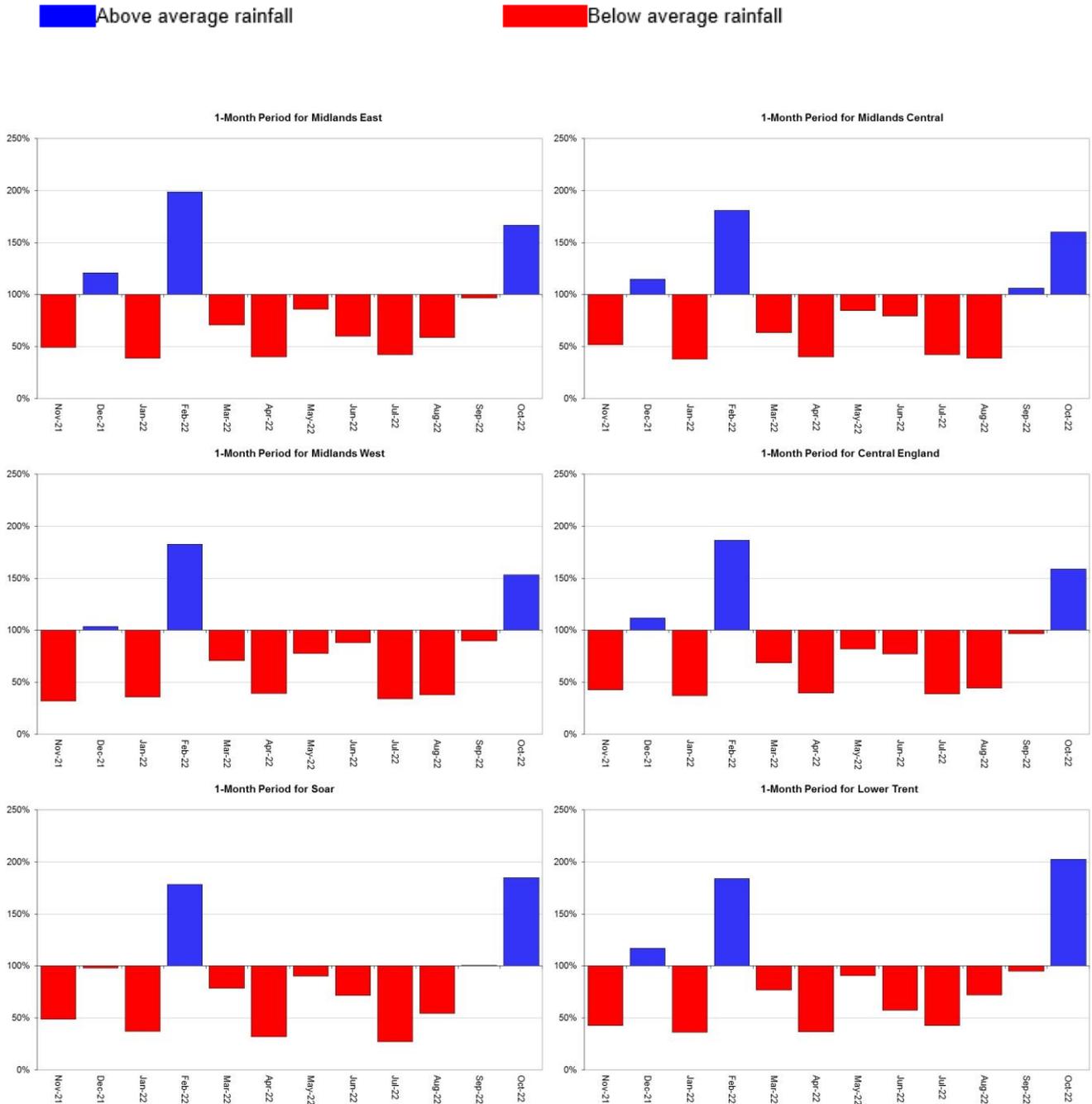
Figure 2.1: Total rainfall for hydrological areas for the current month (up to 31 October 2022), the last 3 months, the last 6 months, and the last 12 months, classed relative to an analysis of respective historic totals. Table available in the appendices with detailed information.



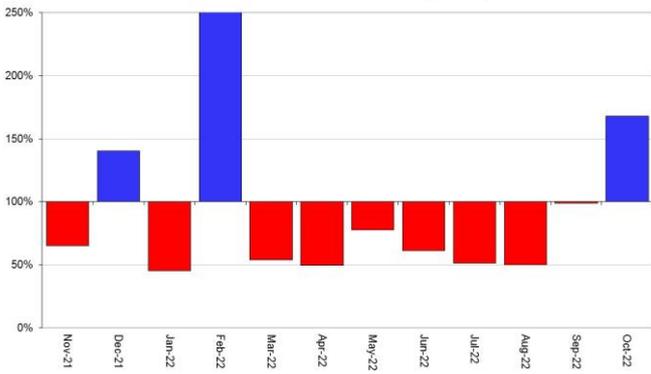
HadUK data based on the Met Office 1km gridded rainfall dataset derived from rain gauges (Source: Met Office. Crown copyright, 2022). Provisional data based on Environment Agency 1km gridded rainfall dataset derived from Environment Agency intensity rain gauges. Crown copyright. All rights reserved. Environment Agency, 100024198, 2022.

## 2.2 Rainfall charts

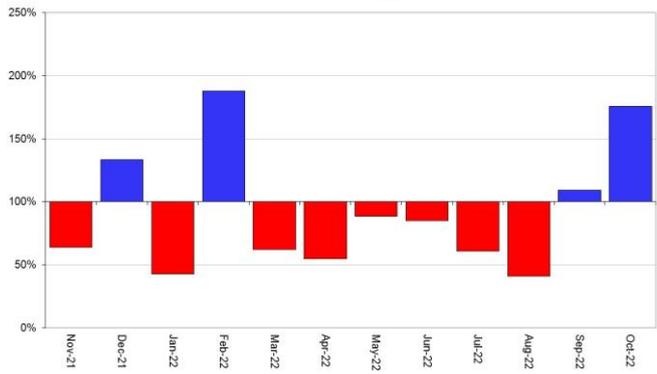
Figure 2.2: Monthly rainfall totals for the past 12 months as a percentage of the 1961 to 1990 long term average for each region and for England.



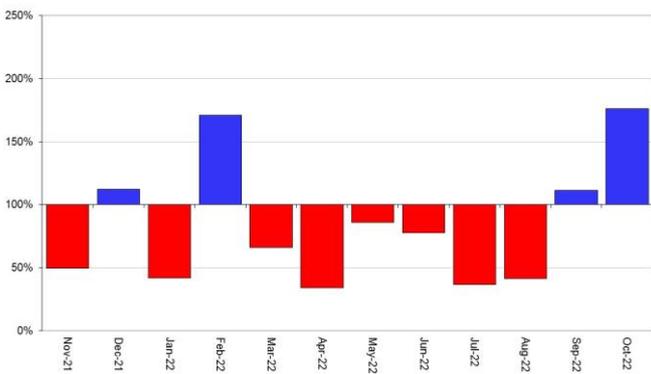
1-Month Period for Derwent (Midlands)



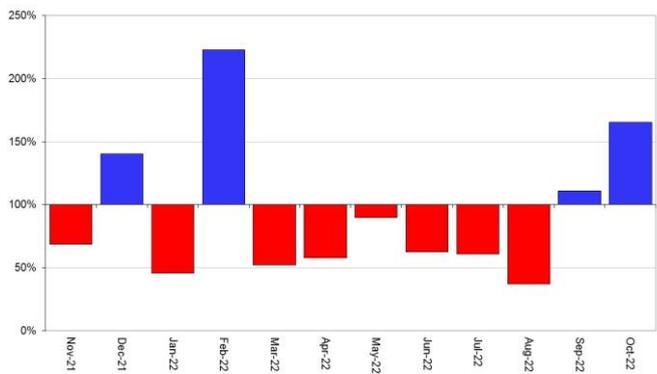
1-Month Period for Upper Trent



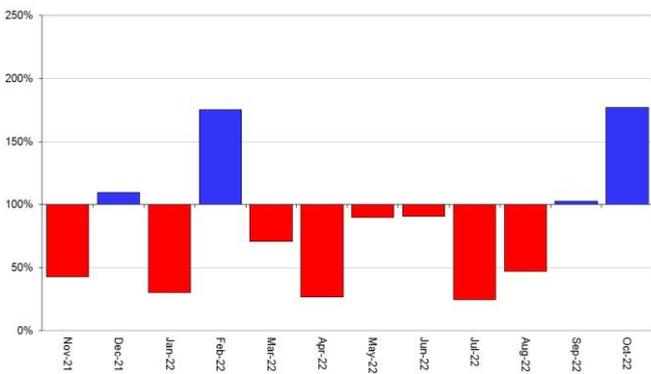
1-Month Period for Tame



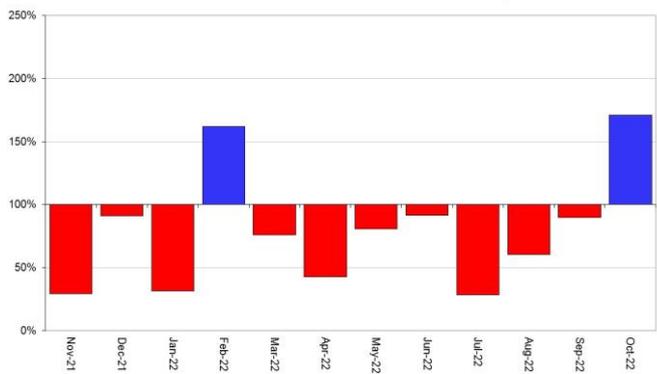
1-Month Period for Dove

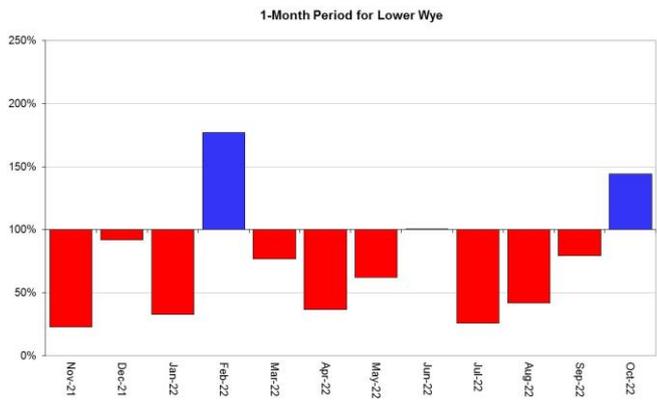
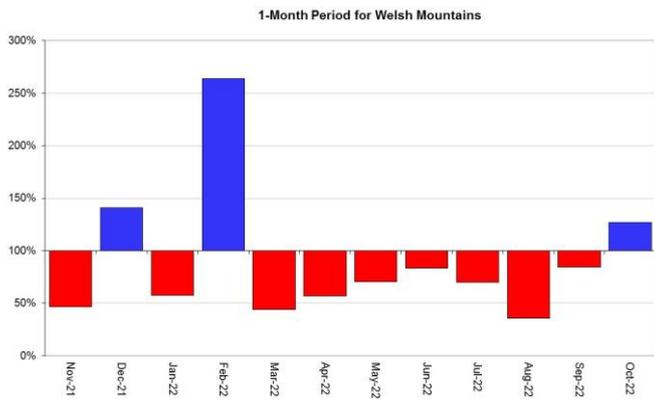
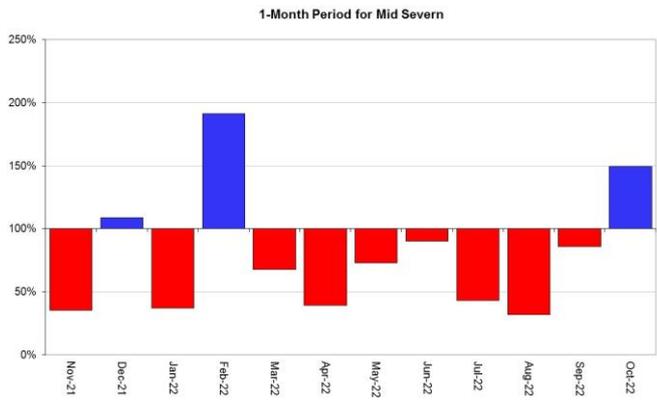
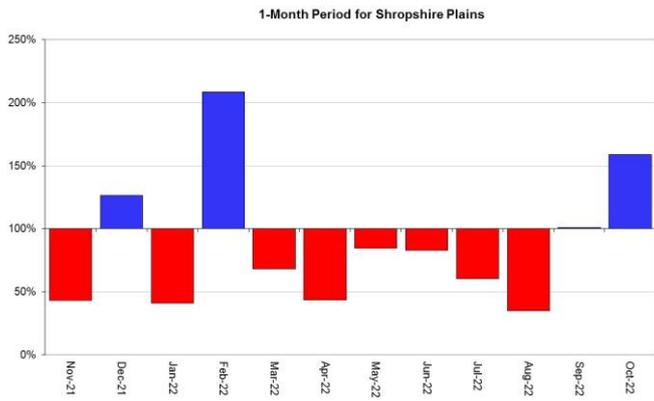


1-Month Period for Avon to Evesham



1-Month Period for Lower Severn Estuary



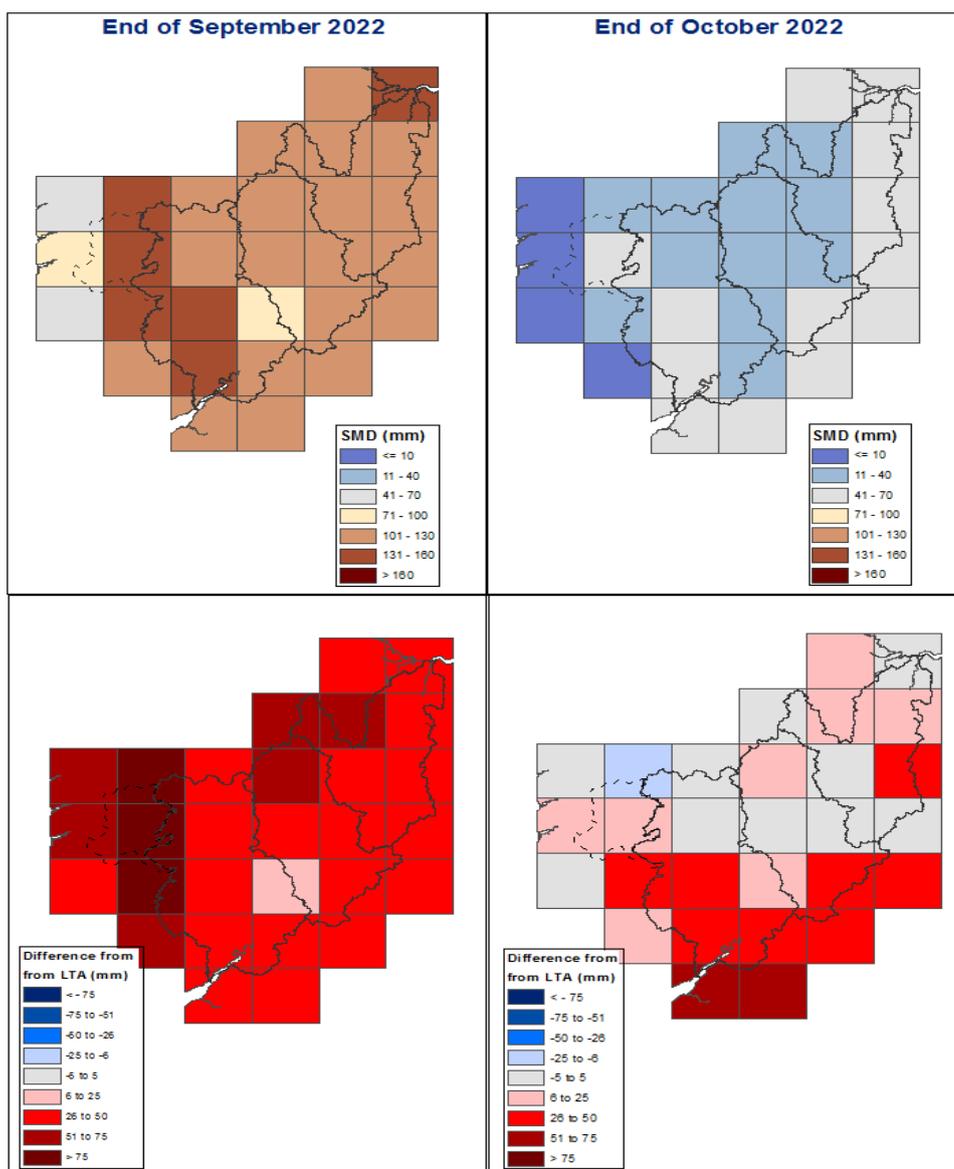


HadUK rainfall data. (Source: Met Office. Crown copyright, 2022).

### 3 Soil moisture deficit

#### 3.1 Soil moisture deficit map

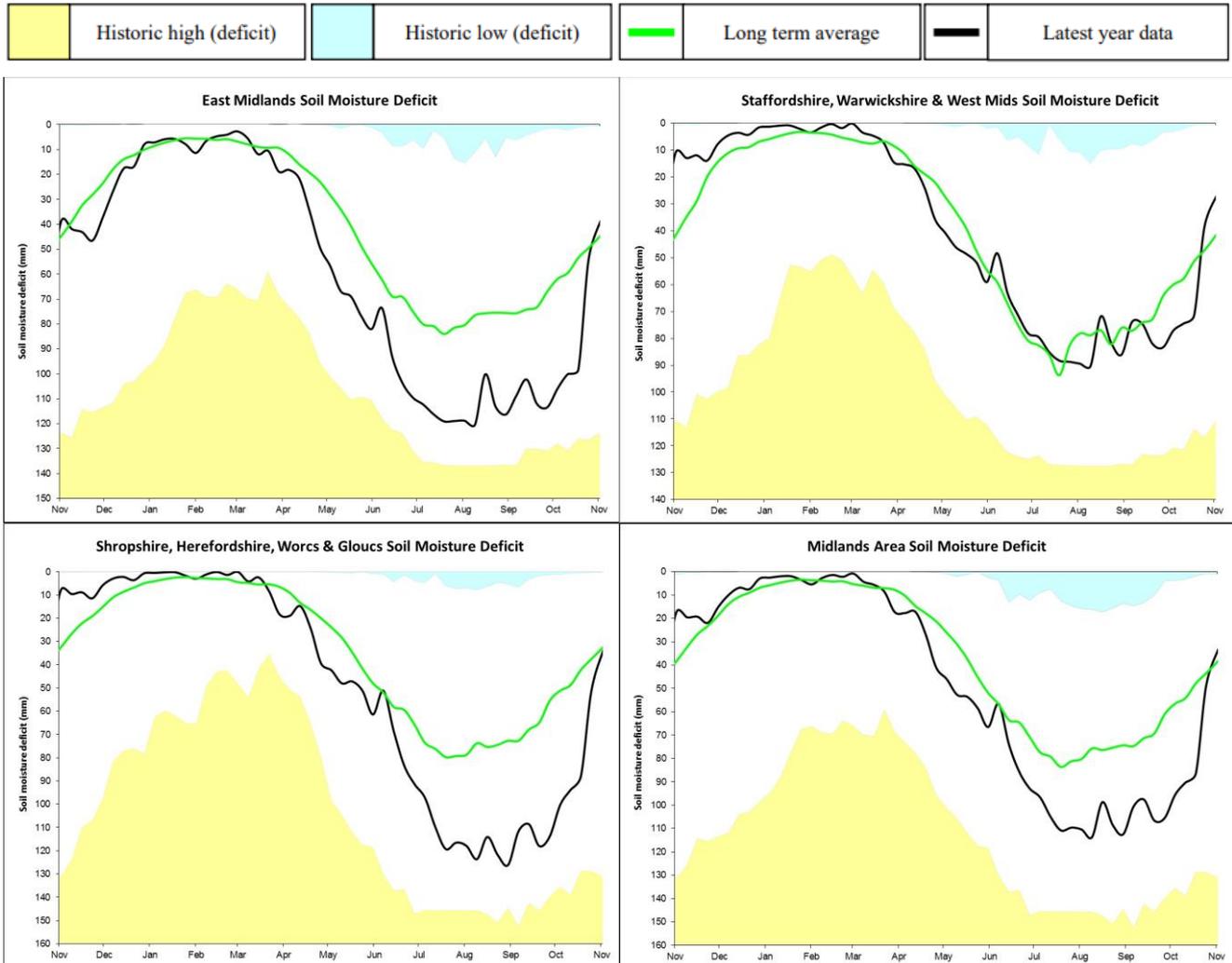
Figure 3.1: Soil moisture deficits for weeks ending 31 October 2022. Shows the difference (mm) of the actual soil moisture deficit from the 1961 to 1990 long term average soil moisture deficits. MORECS data for real land use.



(Source: Met Office. Crown copyright, 2022). All rights reserved. Environment Agency, 100024198, 2022.

### 3.2 Soil moisture deficit charts

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

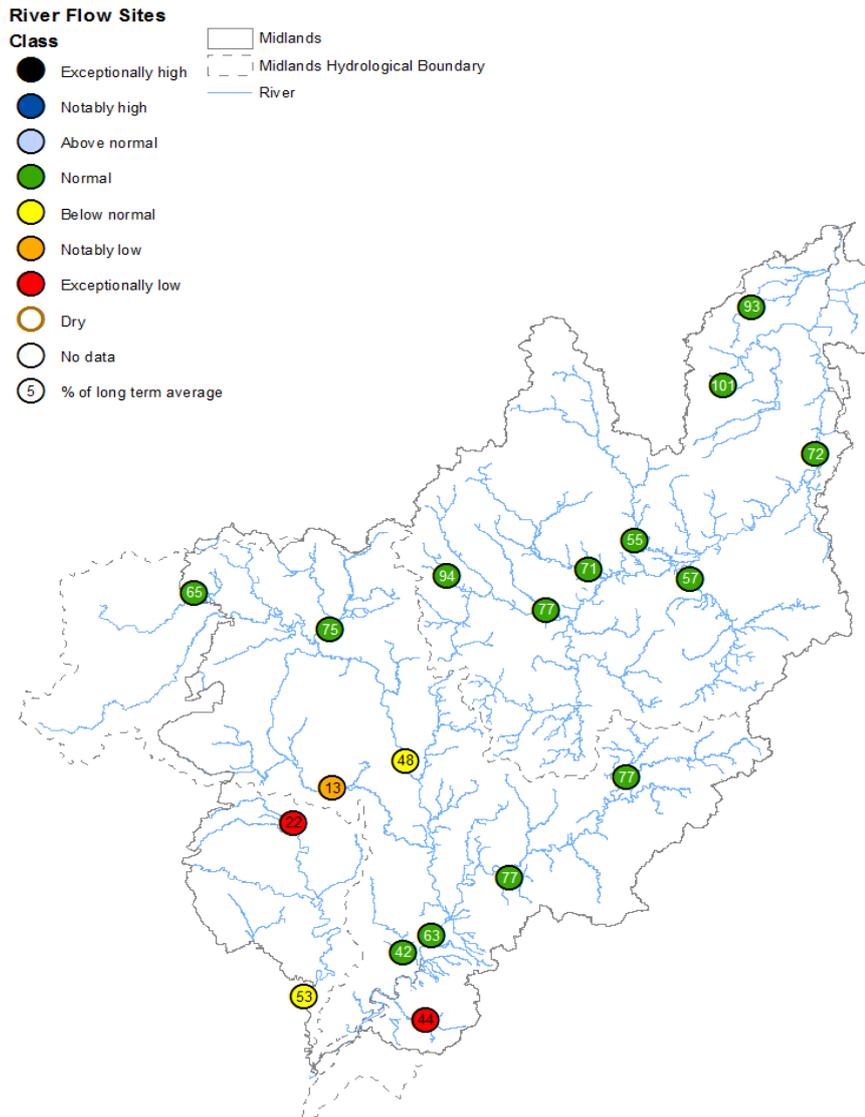


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# 4 River flows

## 4.1 River flows map

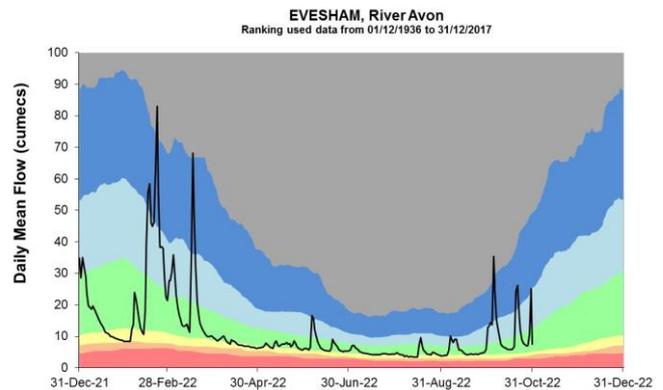
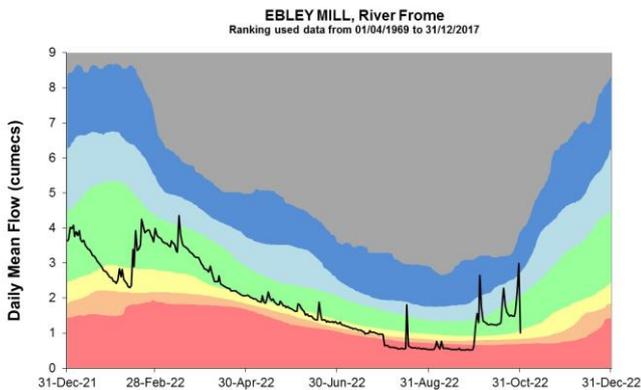
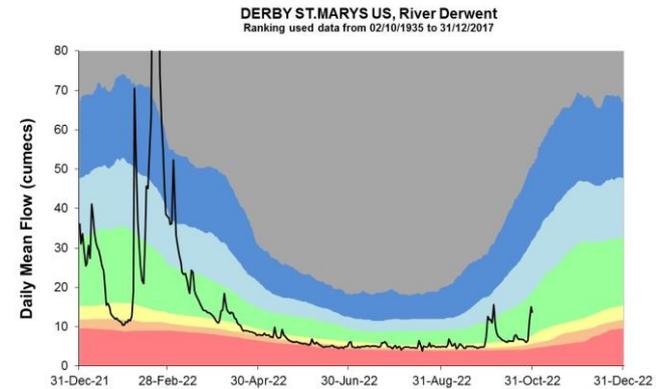
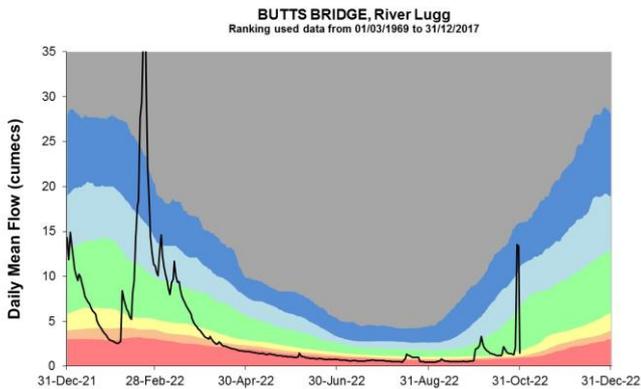
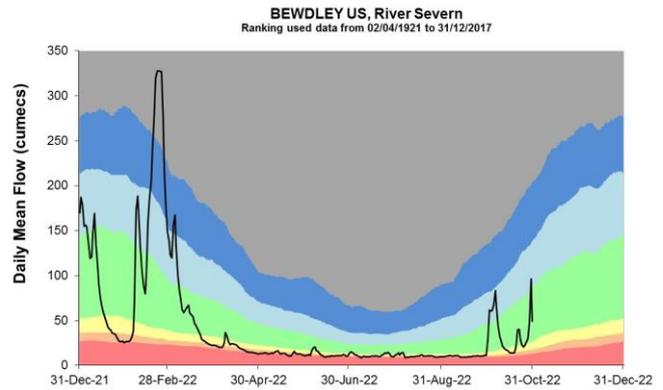
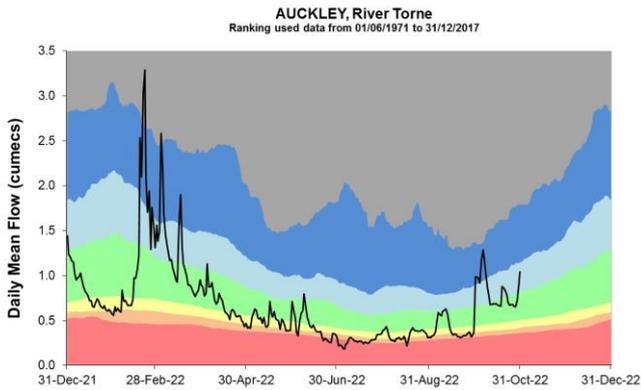
Figure 4.1: Monthly mean river flow for indicator sites for [October 2022], expressed as a percentage of the respective long term average and classed relative to an analysis of historic October monthly means. Table available in the appendices with detailed information.



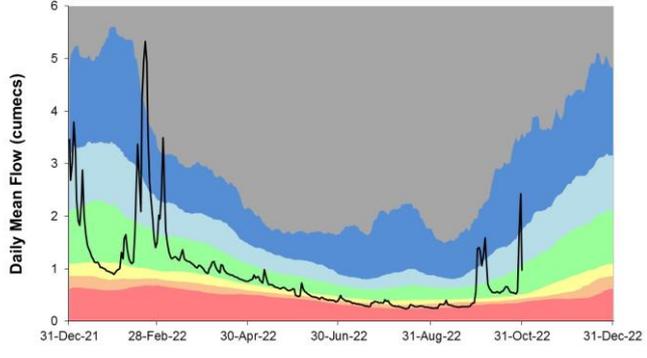
(Source: Environment Agency). Crown copyright. All rights reserved. Environment Agency, 100024198, 2022.

## 4.2 River flow charts

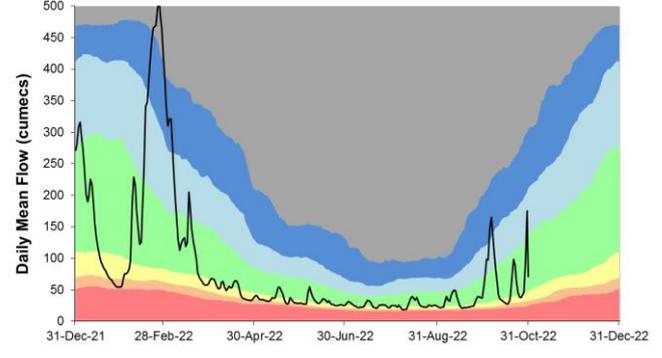
Figure 4.2: Daily mean river flow for index sites over the past 10 months, compared to an analysis of historic daily mean flows.



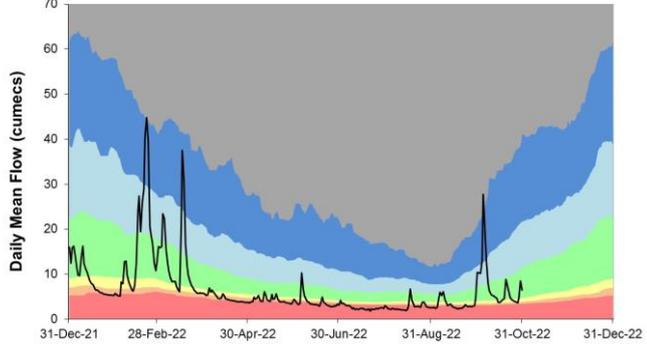
**GREAT BRIDGFORD, River Sow**  
Ranking used data from 18/01/1971 to 31/12/2017



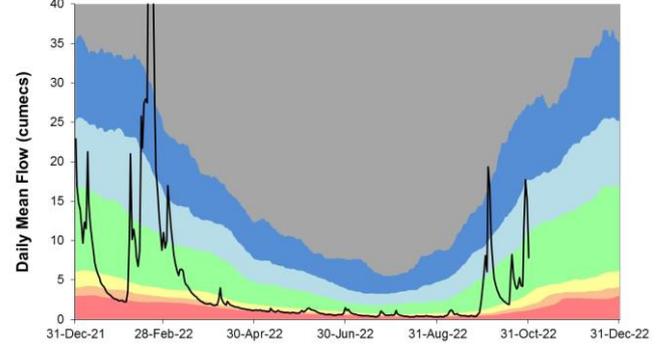
**HAW BRIDGE, River Severn**  
Ranking used data from 01/07/1971 to 31/12/2017



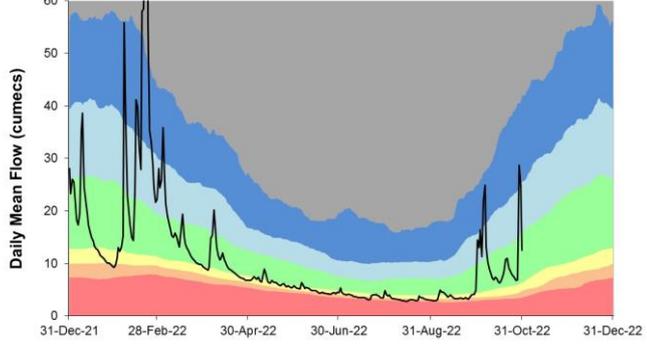
**KEGWORTH US, River Soar**  
Ranking used data from 01/12/1978 to 31/12/2017



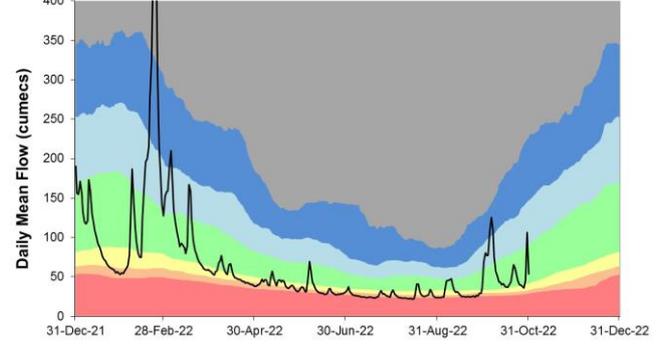
**LLANYBLODWEL, Afon Tanat**  
Ranking used data from 01/06/1973 to 31/12/2017



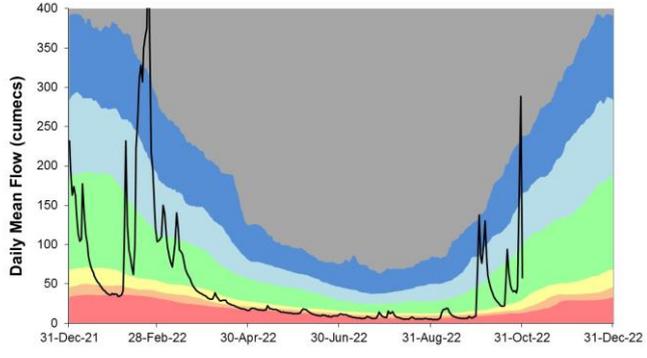
**MARSTON ON DOVE, River Dove**  
Ranking used data from 01/07/1965 to 31/12/2017



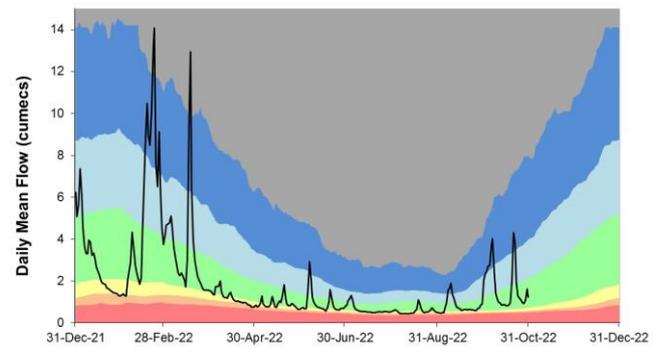
**NORTH MUSKHAM, River Trent**  
Ranking used data from 31/10/1969 to 31/12/2017

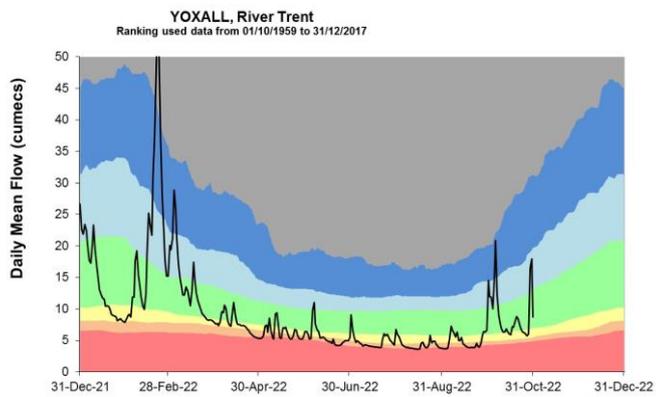
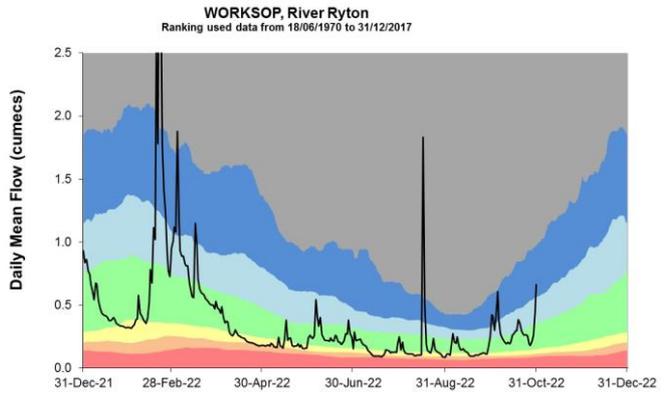
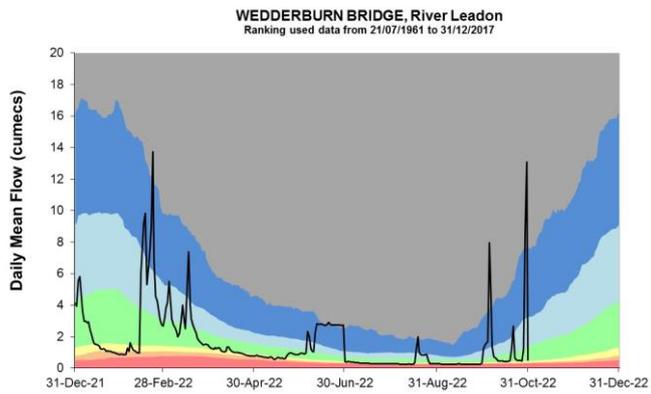
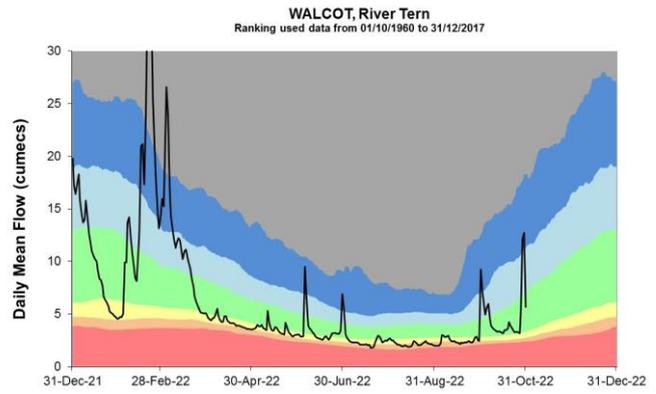
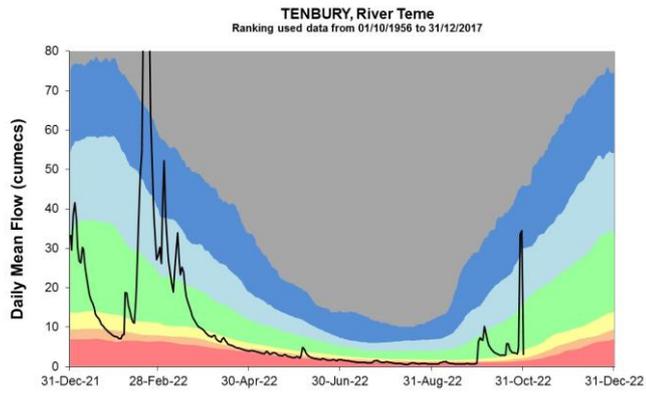


**REDBROOK, River Wye**  
Ranking used data from 01/10/1969 to 31/12/2017



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



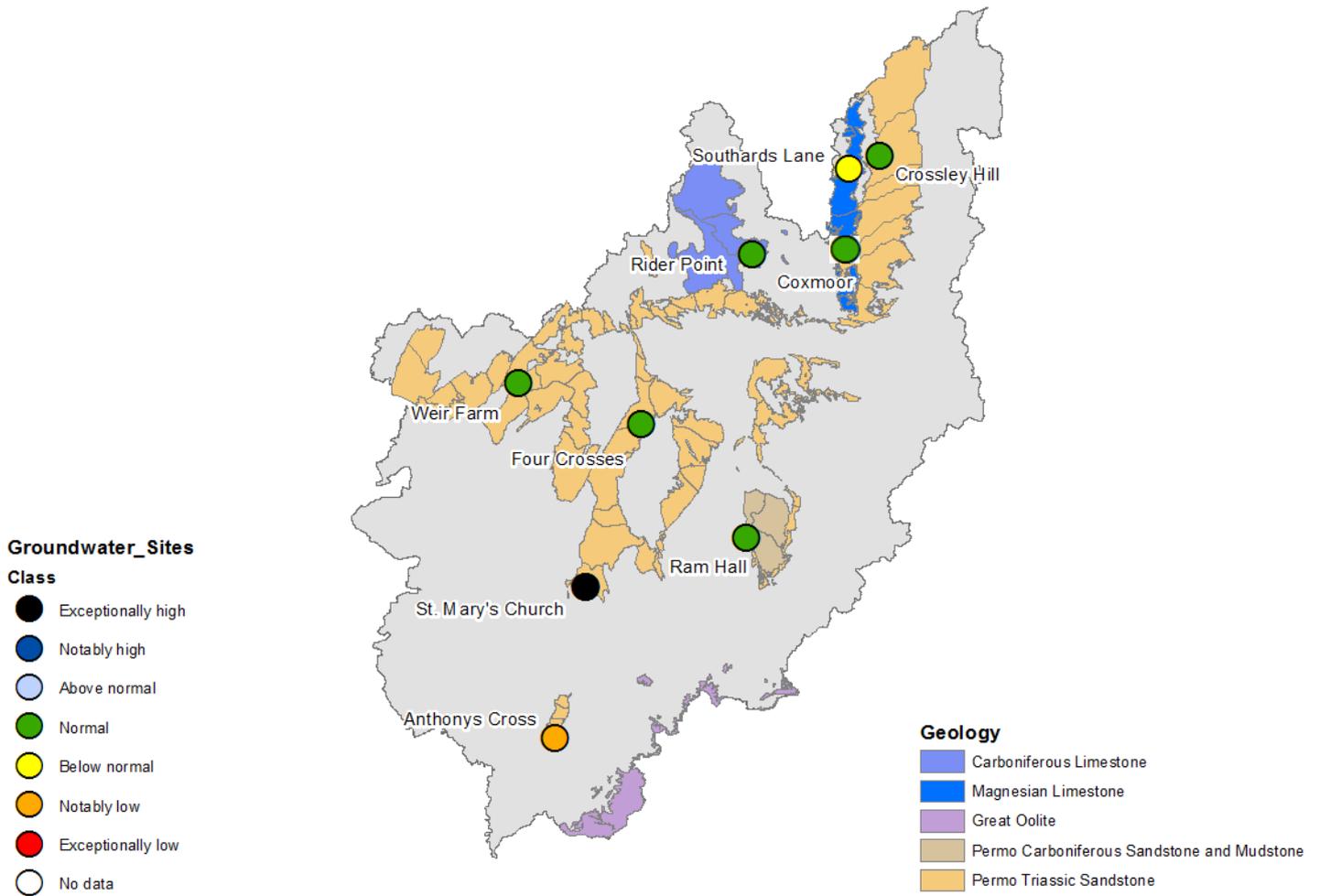


Source: Environment Agency.

# 5 Groundwater levels

## 5.1 Groundwater levels map

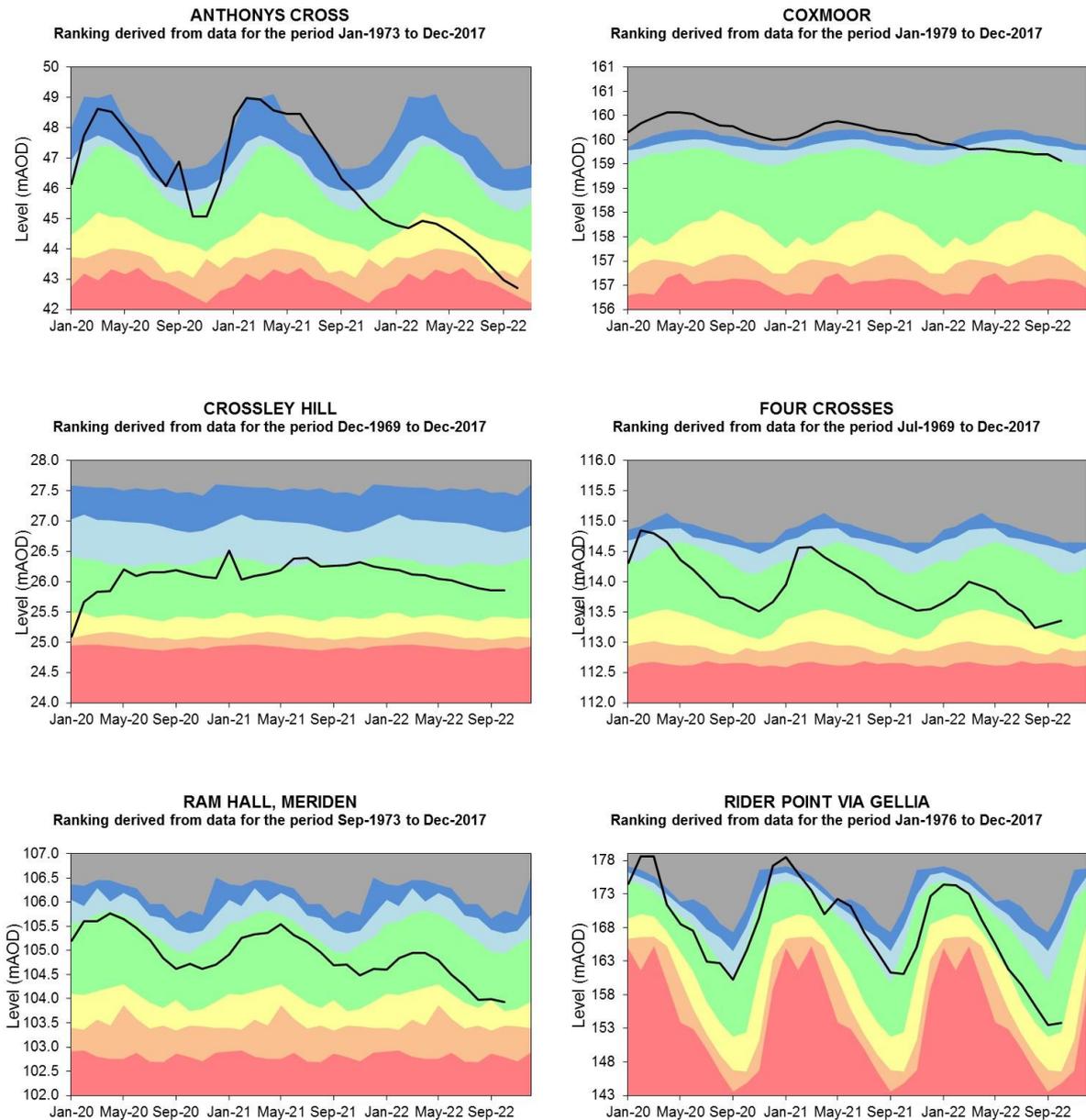
Figure 5.1: Groundwater levels for indicator sites at the end of [October 2022], classed relative to an analysis of respective historic October levels. Table available in the appendices with detailed information.

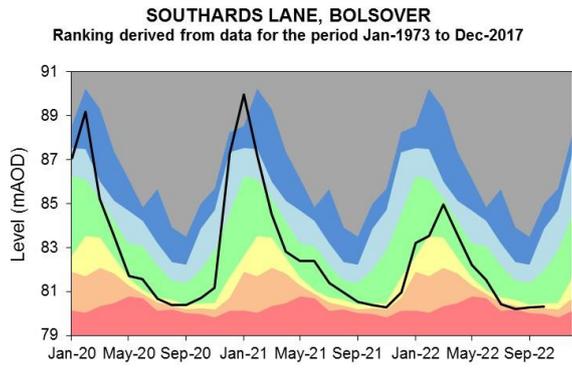
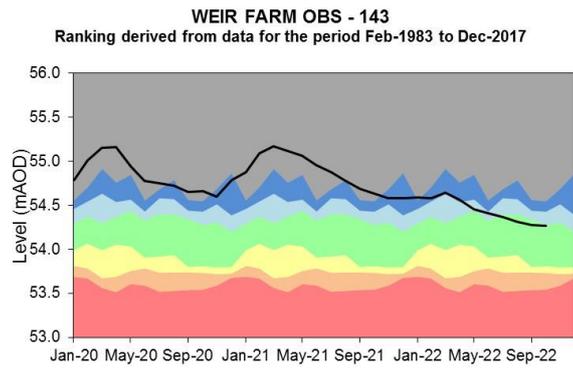
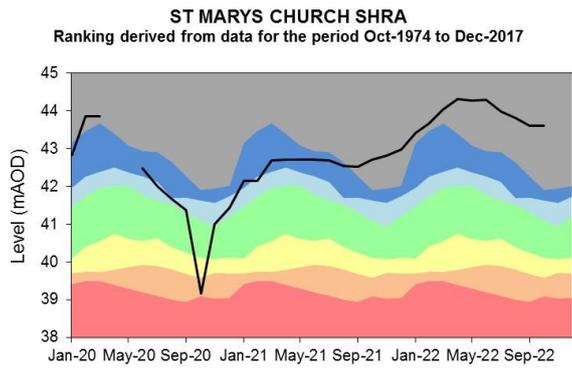


(Source: Environment Agency). Geological map reproduced with kind permission from UK Groundwater Forum, BGS copyright NERC. Crown copyright. All rights reserved. Environment Agency, 100024198, 2022.

## 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.

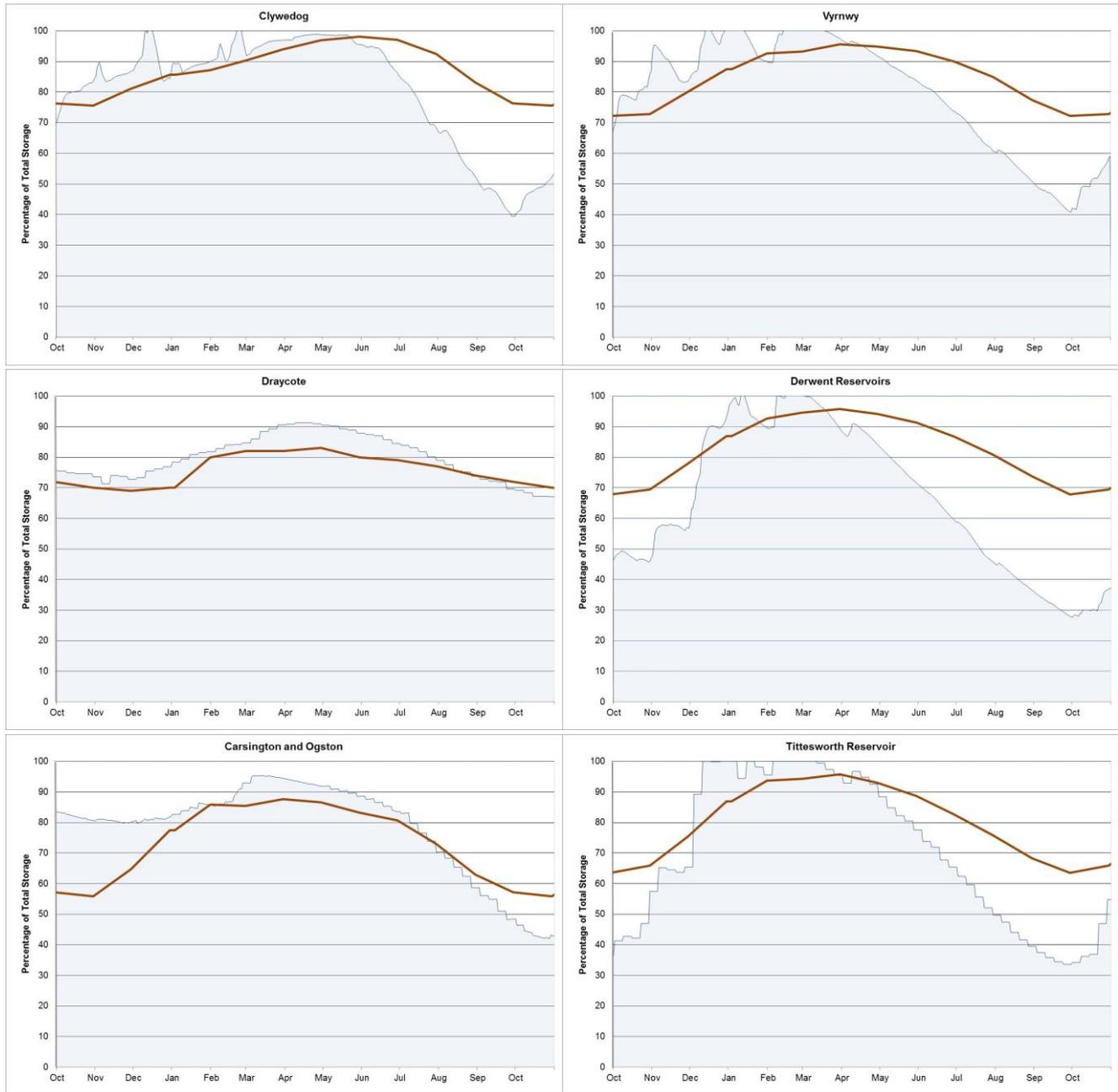


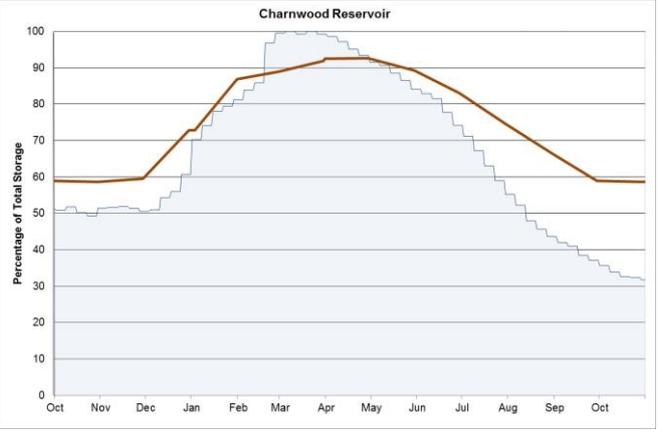
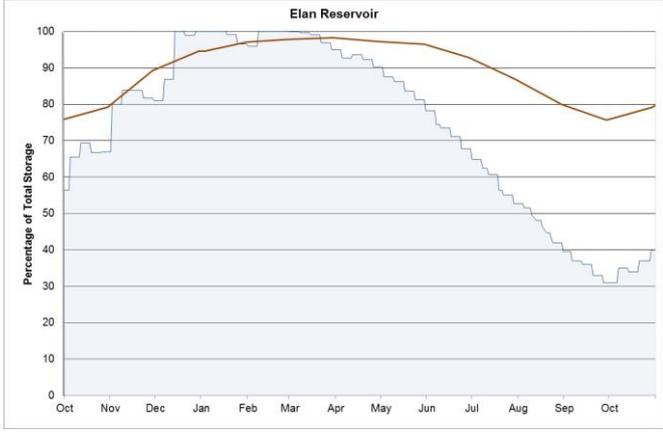
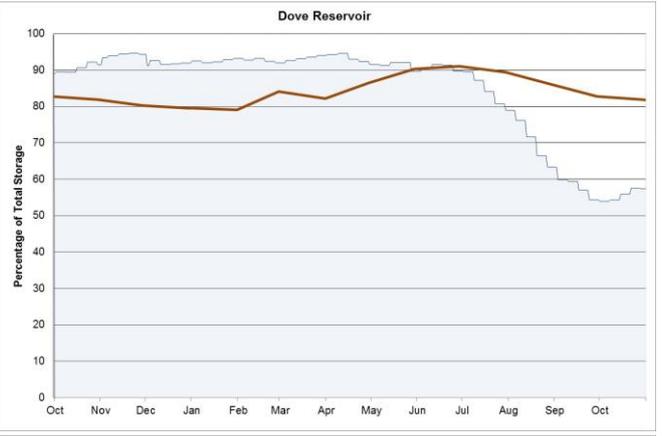
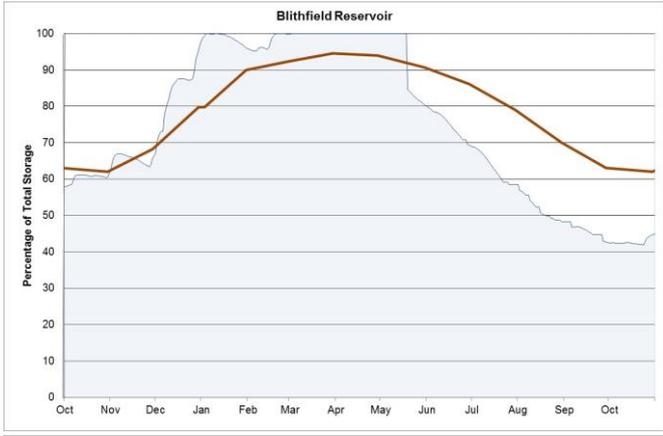


Source: Environment Agency, 2022.

# 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.





(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 ( $\text{m}^3\text{s}^{-1}$ ).

#### **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**

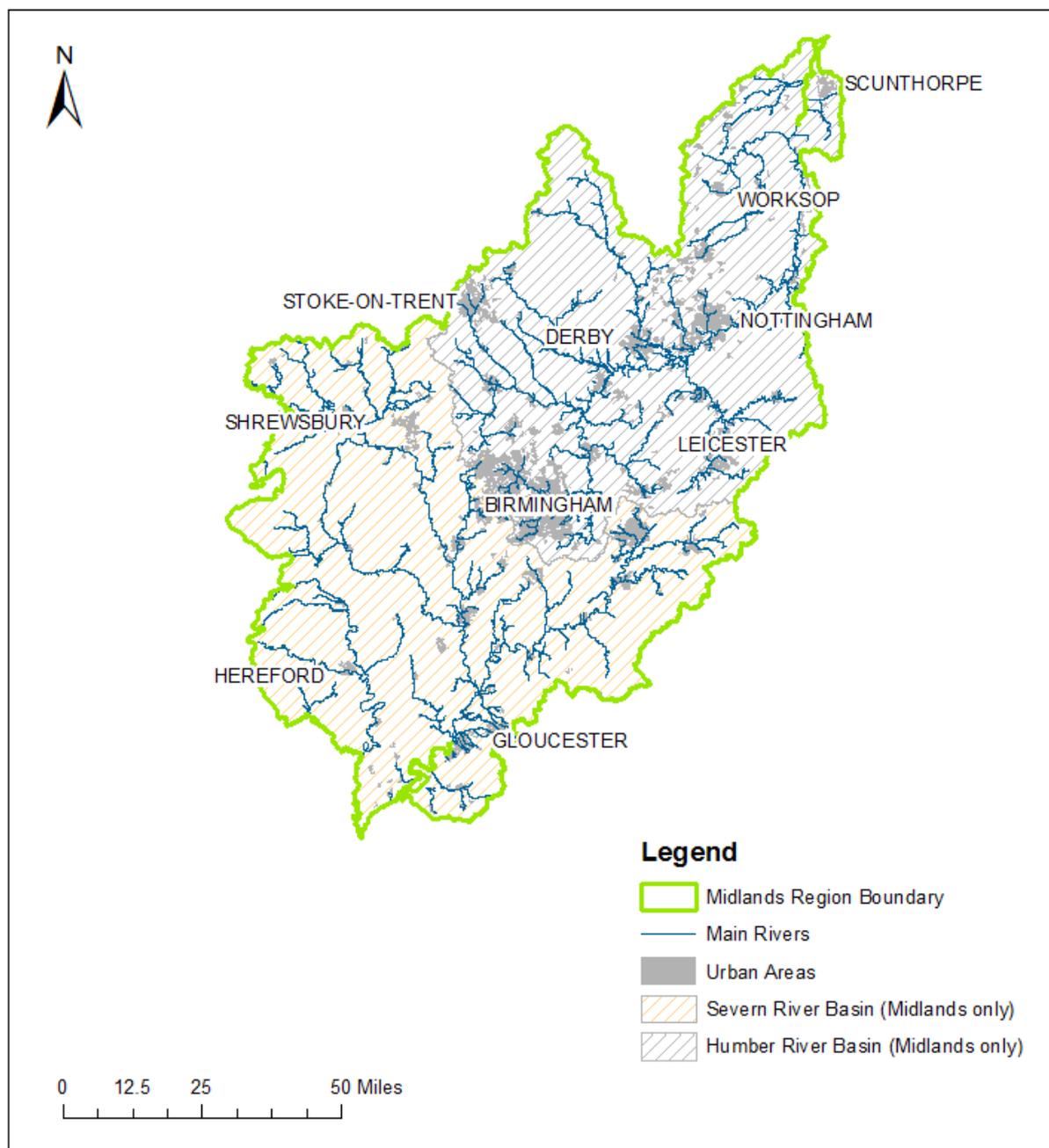
Value likely to fall within this band 8% of the time.

### **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

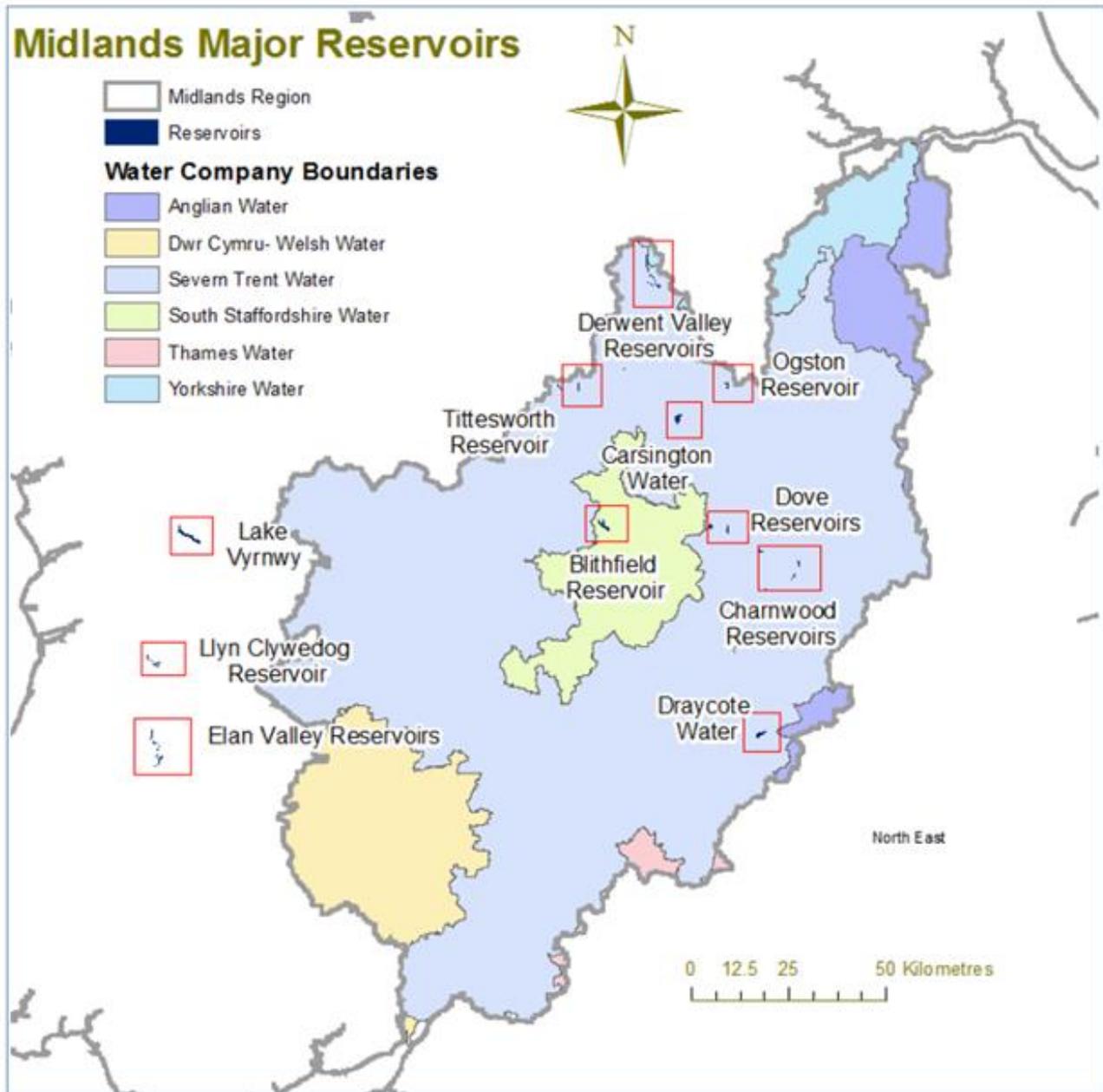
Figure 7.2: The 12 hydrological areas that make up the Midlands region. Natural Resources Wales are not currently producing a monthly water situation report.



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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	Oct 2022 rainfall % of long term average 1961 to 1990	Oct 2022 band	Aug 2022 to October cumulative band	May 2022 to October cumulative band	Nov 2021 to October cumulative band
Avon To Evesham	177	Above Normal	Normal	Below normal	Notably low
Derwent (midlands)	168	Notably High	Normal	Below normal	Normal
Dove	165	Above Normal	Normal	Below normal	Normal
Lower Severn Estuary	171	Above Normal	Normal	Below normal	Notably low
Lower Trent	203	Notably High	Normal	Below normal	Below normal
Lower Wye	144	Above Normal	Normal	Notably low	Exceptionally low
Mid Severn	149	Above Normal	Normal	Below normal	Notably low
Shropshire Plains	159	Above Normal	Normal	Below normal	Below normal
Soar	185	Above Normal	Normal	Below normal	Notably low
Tame	176	Notably High	Normal	Below normal	Notably low

Upper Trent	176	Notably High	Normal	Normal	Normal
Welsh Mountains	127	Normal	Normal	Notably low	Below normal

## 8.2 River flows table

Site name	River	Catchment	Oct 2022 band	Sep 2022 band
Auckley	Torne	Torne	Normal	Below normal
Bewdley Us	Severn	Severn Lower Mid	Below normal	Exceptionally low
Butts Bridge	Lugg	Lugg	Exceptionally low	Exceptionally low
Derby St.marys Us	Derwent (mi)	Derwent Der to Markeaton con	Normal	Below normal
Ebley Mill	Frome (glos)	Frome Gloucs	Exceptionally low	Exceptionally low
Evesham	Avon (mi)	Avon Warwks Lower	Normal	Normal
Great Bridgford	Sow	Sow Upper	Normal	Exceptionally low
Haw Bridge	Severn	Severn Lower	Normal	Normal
Kegworth Us	Soar	Soar to Kingston Brook confl	Normal	Notably low
Llanyblodwel	Tanat	Severn Upper River Tanat	Normal	Below normal
Marston On Dove	Dove (mi)	Dove Derb to Hilton Br confl	Normal	Below normal

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

### 8.3 Groundwater table

Site name	Aquifer	End of Oct 2022 band	End of Sep 2022 band
Weir Farm	Bridgnorth Sandstone Formation	Normal	Normal
Four Crosses	Grimsby Ancholme Louth Limestone	Normal	Normal
Ram Hall, Meriden	Grimsby Ancholme Louth Limestone	Normal	Normal
Rider Point Via Gellia	Carboniferous Limestone	Normal	Normal
Crossley Hill	Permo Triassic Sandstone	Normal	Normal
Coxmoor	Permo Triassic Sandstone	Notably high	Above normal
Southards Lane, Bolsover	Magnesian Limestone	Below normal	Below normal
Anthony's Cross	Severn Vale Permo-triassic Sandstone	Notably low	Notably low
St Marys Church, Shrawley	East Shropshire Permo-triassic Sandstone	Exceptionally high	Exceptionally high