Monthly water situation report: East Anglia

1 Summary – October 2024

On average, October was slightly wet for the time of year, most catchments receiving only a little more than 100% of their long term average rainfalls for the month, and only one catchment falling below average. A significant portion of this rainfall occurred at the very beginning of the month, following on from the very wet conditions during the final weeks of September. Soil Moisture Deficits which had been decreasing since middle of September and the onset of this rainfall began to increase again through October, recovering from exceptionally low to normal levels within the month. River flows were particularly high within the western catchments, with the Great Ouse and all its tributaries being exceptionally high for the month. This flow was large at the start of the month but has since decreased significantly as rivers have recovered from September's rainfall. All public water supply reservoirs have levels above their respective normal operating curves.

1.1 Rainfall

October 2024 started as a very wet month, following on from the significant rainfall received at the end of September. October 1st alone received over 20% of the region's average total rainfall for the month, after which daily rainfall totals reduced significantly. Within the last 12 months East Anglia has received 800mm of rainfall, 174mm greater than the long term average. This is the fourth highest November to October 12 month total on record going back to 1871

1.2 Soil moisture deficit and recharge

After significantly dropping to extremely low levels towards the end of September with the cooler and wetter conditions, October 2024 saw soil moisture deficits recover to normal levels with the drier conditions later in the month.

1.3 River flows

River levels were exceptionally high across many rivers towards the end of September with the large volumes of rainfall, persisting into the early days of October before gradually recovering to more baseflow driven conditions. The Rhee, Great Ouse, and all of its tributaries

averaged exceptionally high levels due to the volumes of flow at the beginning of the month. They have since recovered to normal or above normal levels.

1.4 Groundwater levels

After receding for several months, groundwater levels at multiple report sites have begun to rise again, with the reduction at many more plateauing. These changes have occurred mostly within the Ouse catchments which saw the greatest rainfall totals. Hindolveston and Costessey in the northeast are the only sites remaining at normal levels while all others are notably high or higher.

1.5 Reservoir stocks

At the end of October 2024, all water company reservoirs in East Anglia were above their respective normal operating curves. While most have are significantly above their operation curves, Grafham reservoir is only marginally above its own.

1.6 Forward look

1.6.1 Probabilistic ensemble projections for river flows at key sites

For all surface water sites there is a high probability of flows being above normal or higher for December 2024, with a higher probability for normal flows across all catchments excluding the Ivel for March 2025.

1.6.2 Probabilistic ensemble projections for groundwater levels in key aquifers

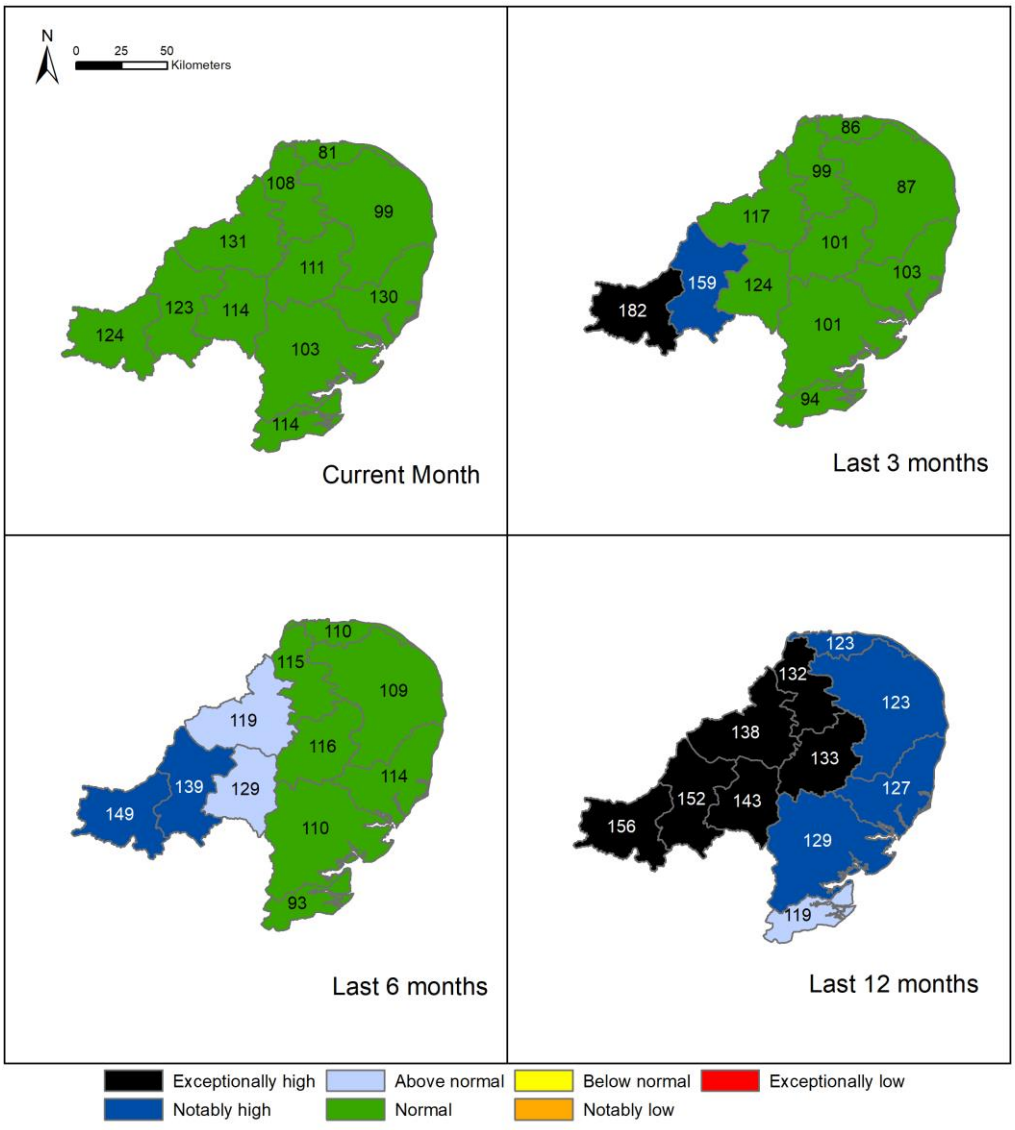
Groundwater levels at all sites have a high probability of above normal or higher levels in March 2025 and September 2025 and a very high probability of normal or higher levels. The probability of below normal or lower flows at Bircham Newton and Therfield Rectory is less than 1% for March and September 2025.

Author: ANG-Hydrology@environment-agency.gov.uk

2 Rainfall

2.1 Rainfall map

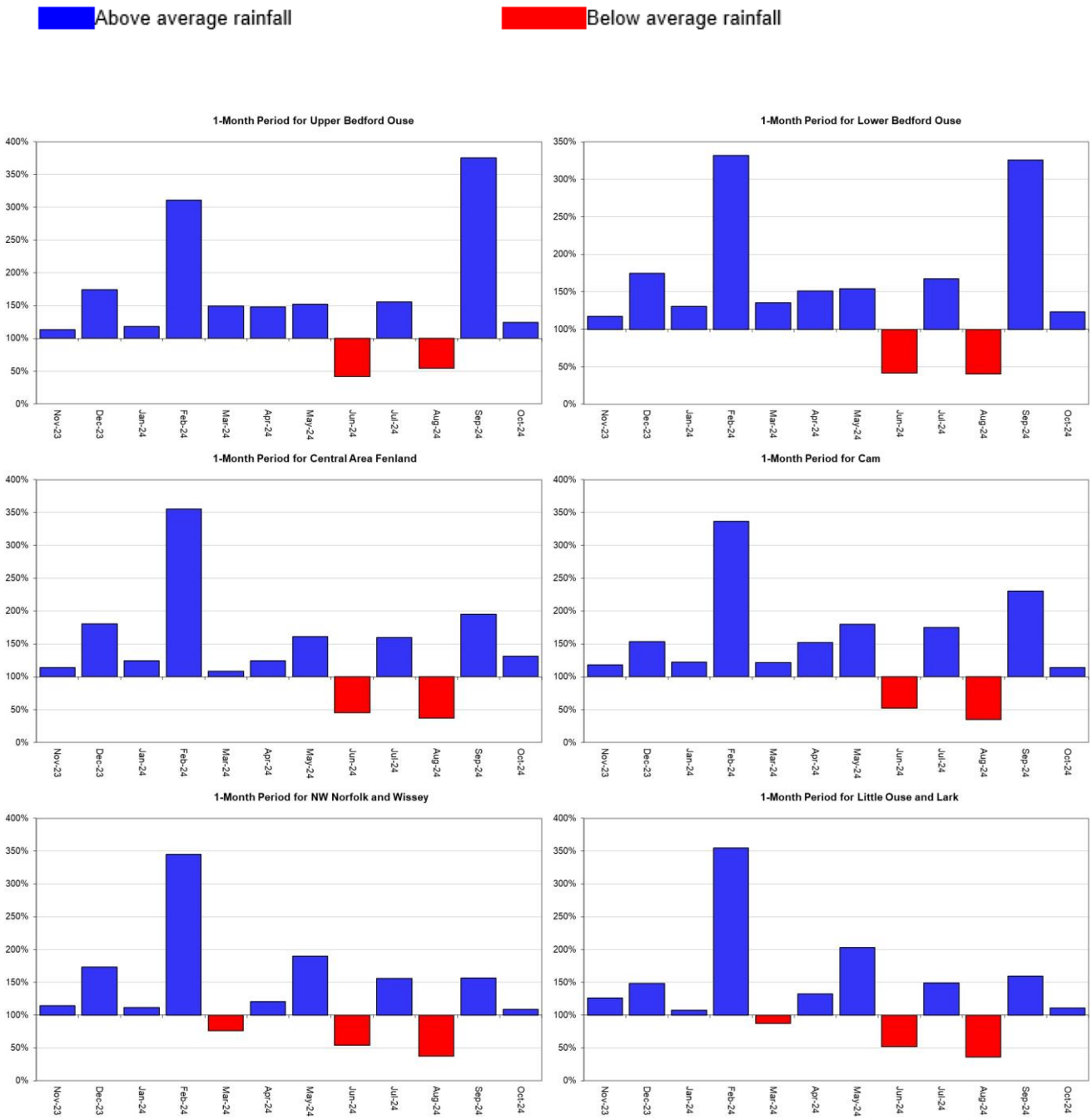
Figure 2.1: Total rainfall for hydrological areas across East Anglia, expressed as a percentage of long term average rainfall for the current month (up to 31 October 2024), the last 3 months, the last 6 months, and the last 12 months. Category classes are based on an analysis of respective historic totals. Table available in the appendices with detailed information.

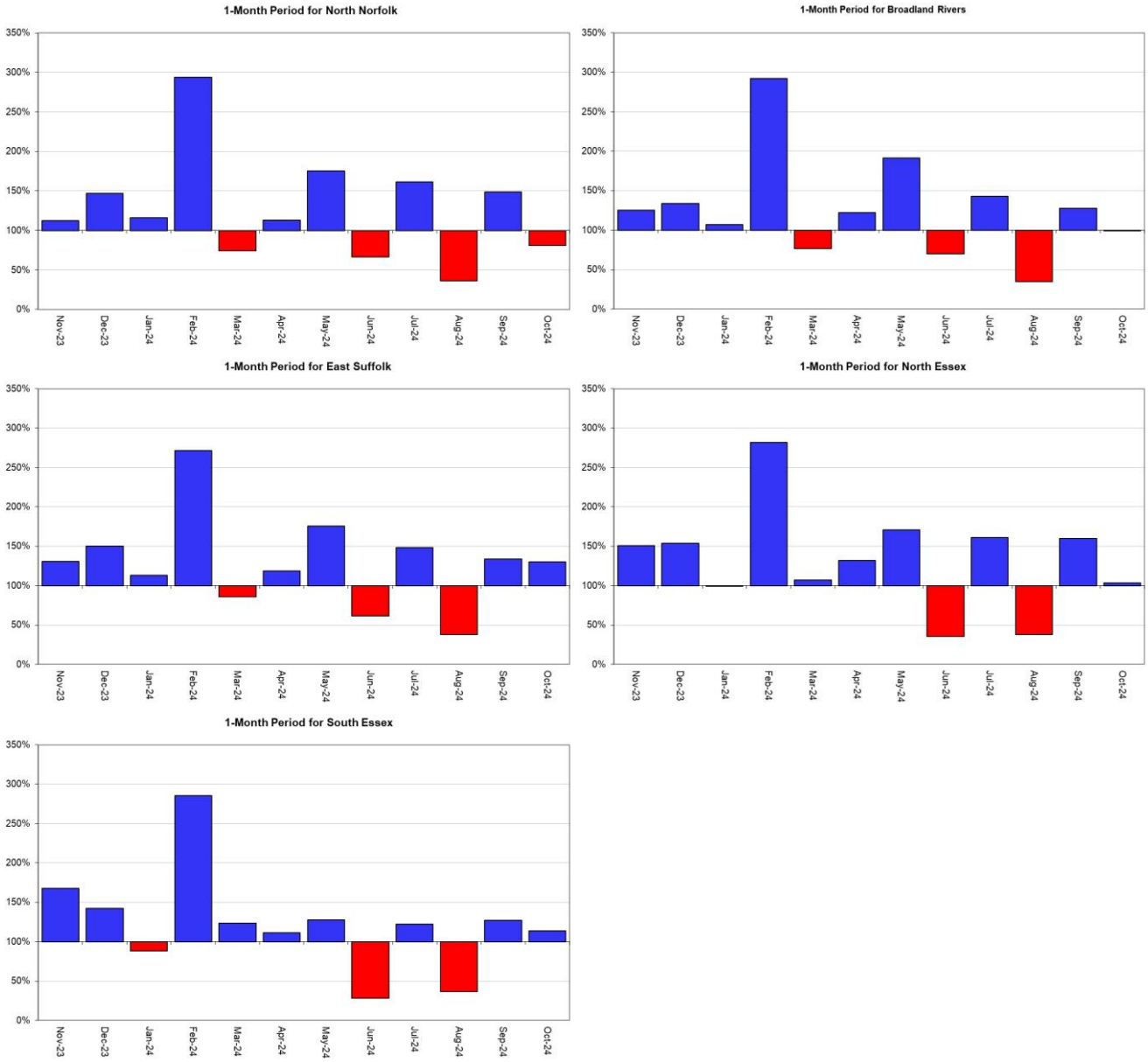


HadUK data based on the Met Office 1km gridded rainfall dataset derived from rain gauges (Source: Met Office. Crown copyright, 2024). Provisional data based on Environment Agency 1km gridded rainfall dataset derived from Environment Agency intensity rain gauges. Crown copyright. All rights reserved.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

2.2 Rainfall charts

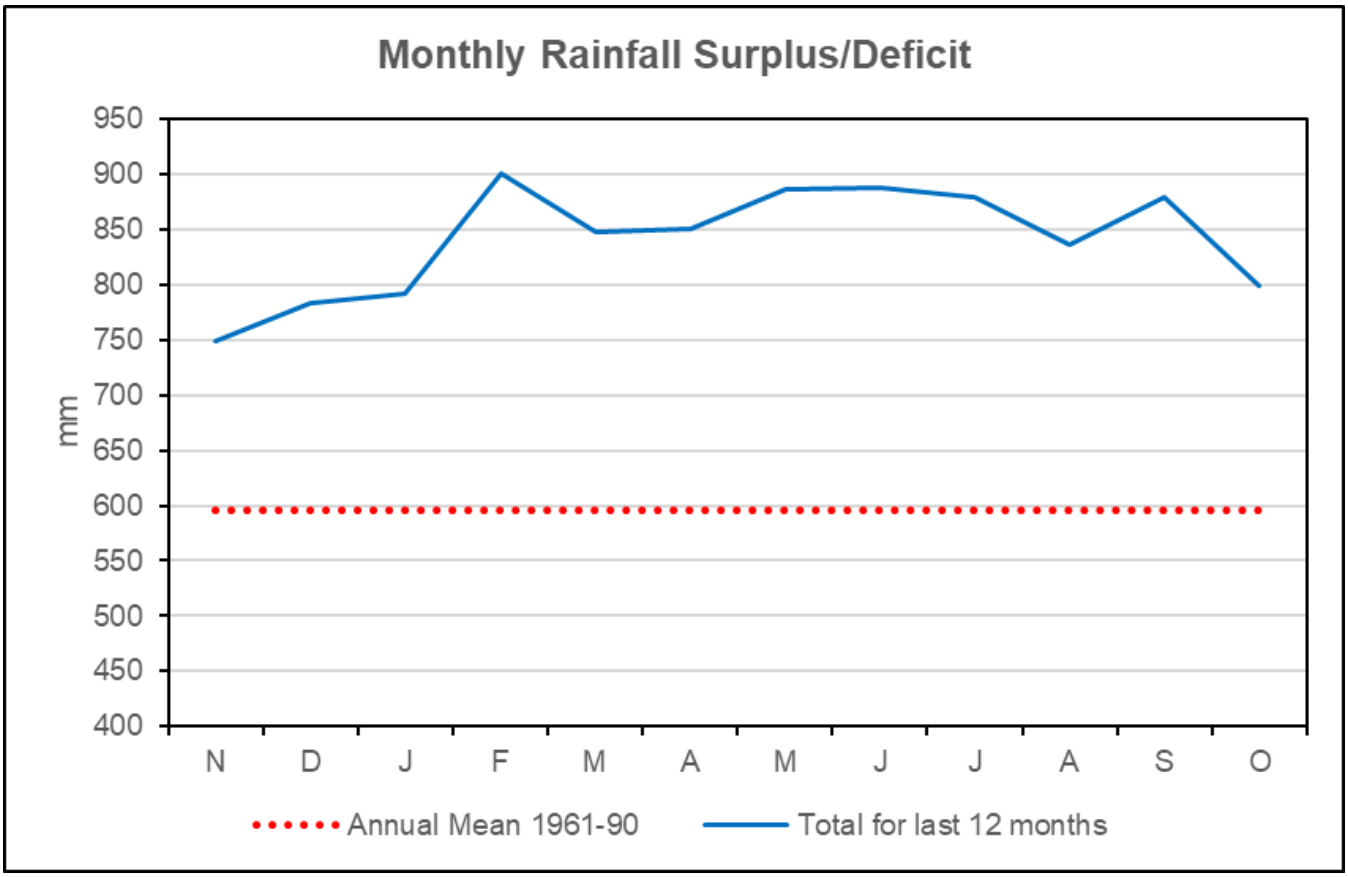
Figure 2.2: Monthly rainfall totals for the past 12 months as a percentage of the 1961 to 1990 long term average for each region and for England.





HadUK rainfall data. (Source: Met Office. Crown copyright, 2024).

2.3 Monthly rainfall surplus deficit chart

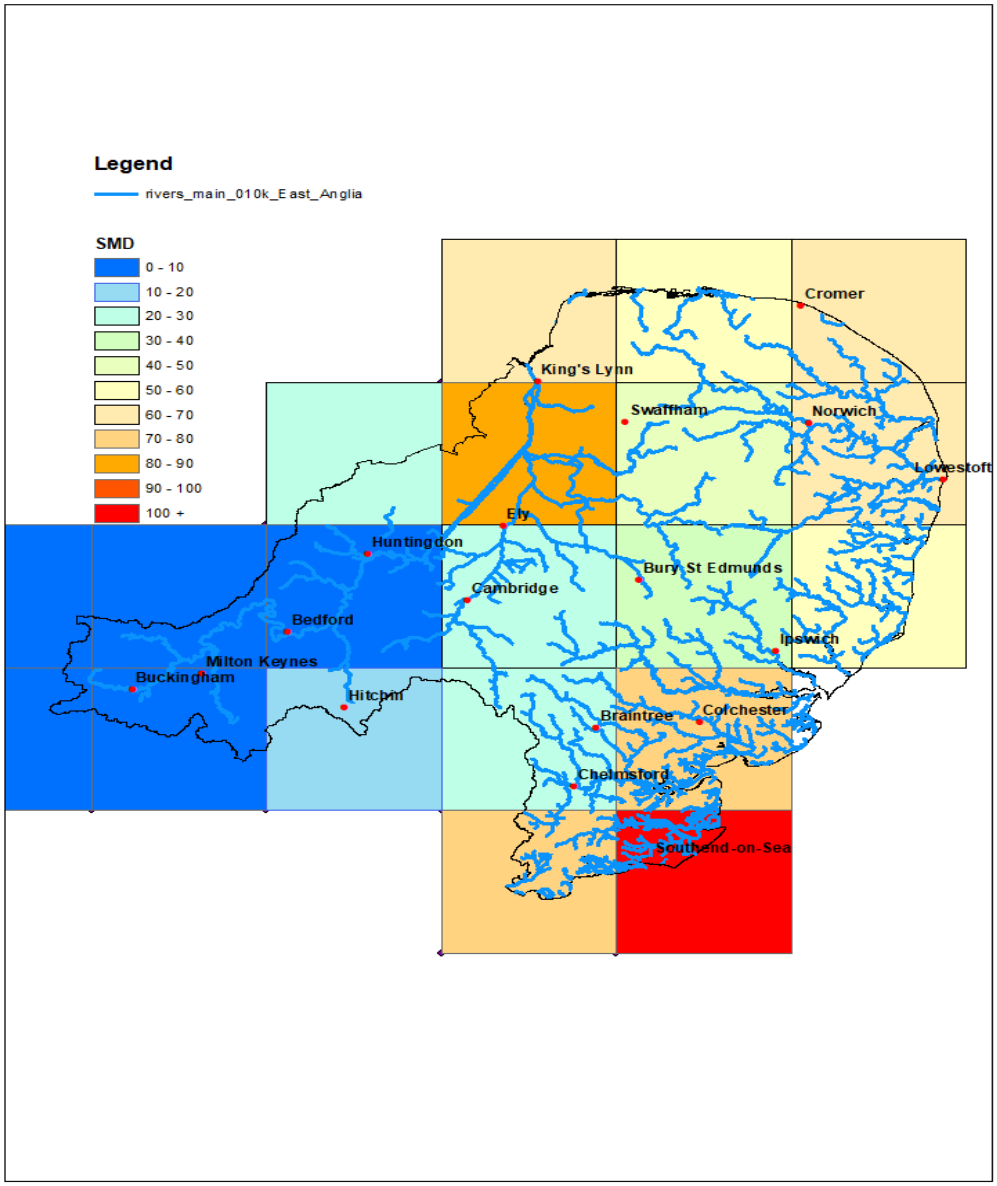


HadUK rainfall data. (Source: Met Office. Crown copyright, 2024).

3 Soil moisture deficit

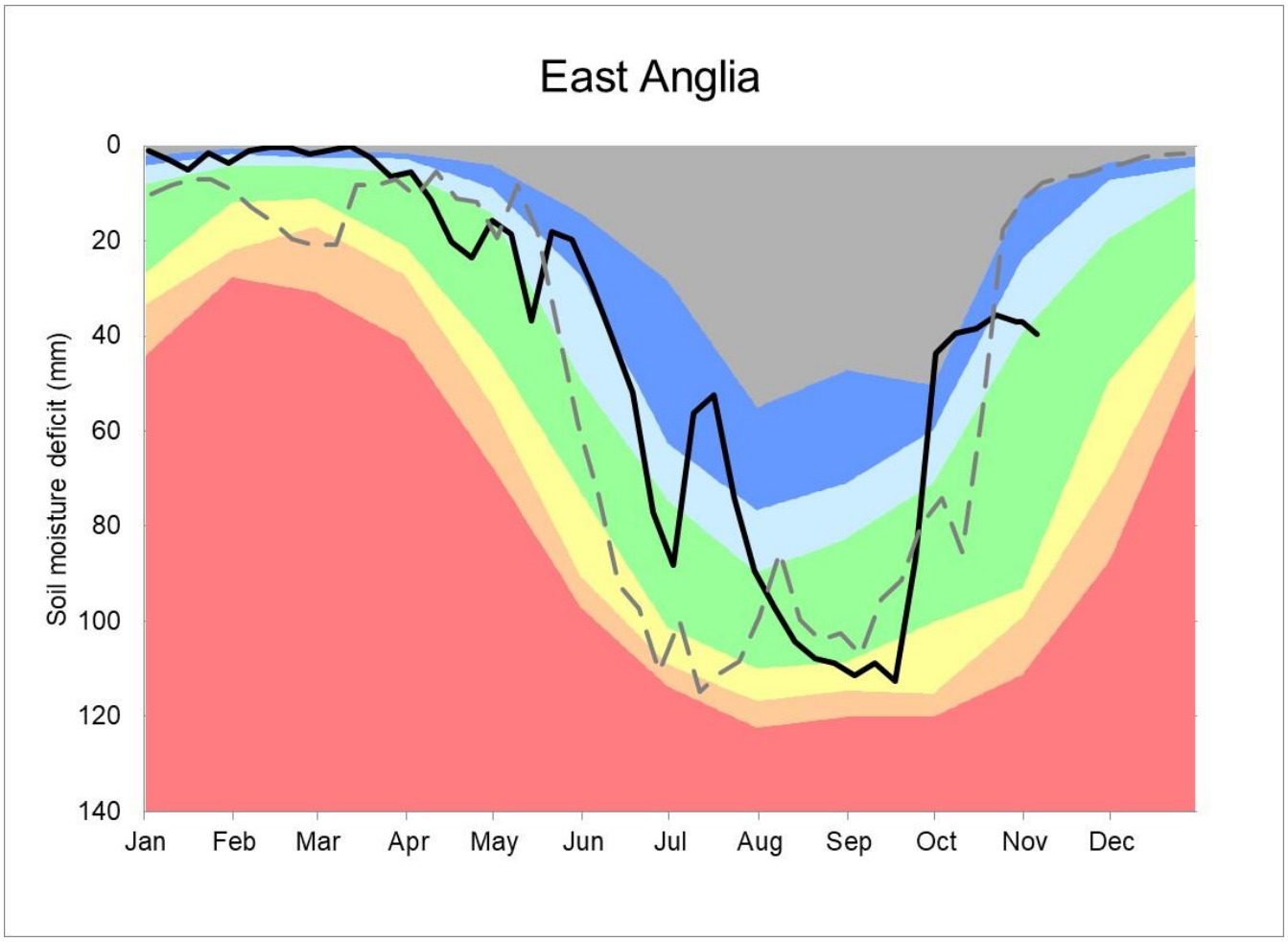
3.1 Soil moisture deficit map

Figure 3.1: Soil moisture deficit values for 30 October 2024. Values based on the weekly MORECS data for real land use.



3.2 Soil moisture deficit charts

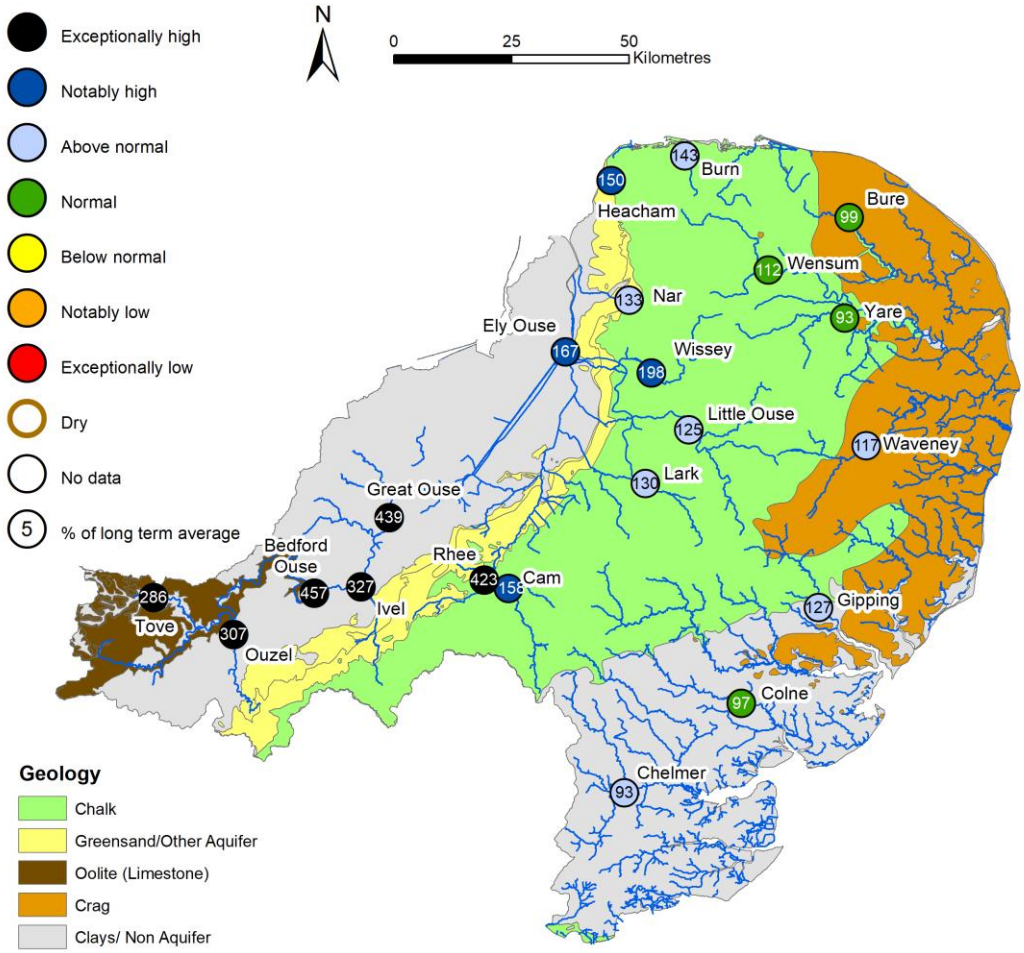
Figure 3.2: Latest soil moisture deficit compared to an analysis of historic 1961 to 1990 long term data set. Weekly MORECS data for real land use.



4 River flows

4.1 River flows map

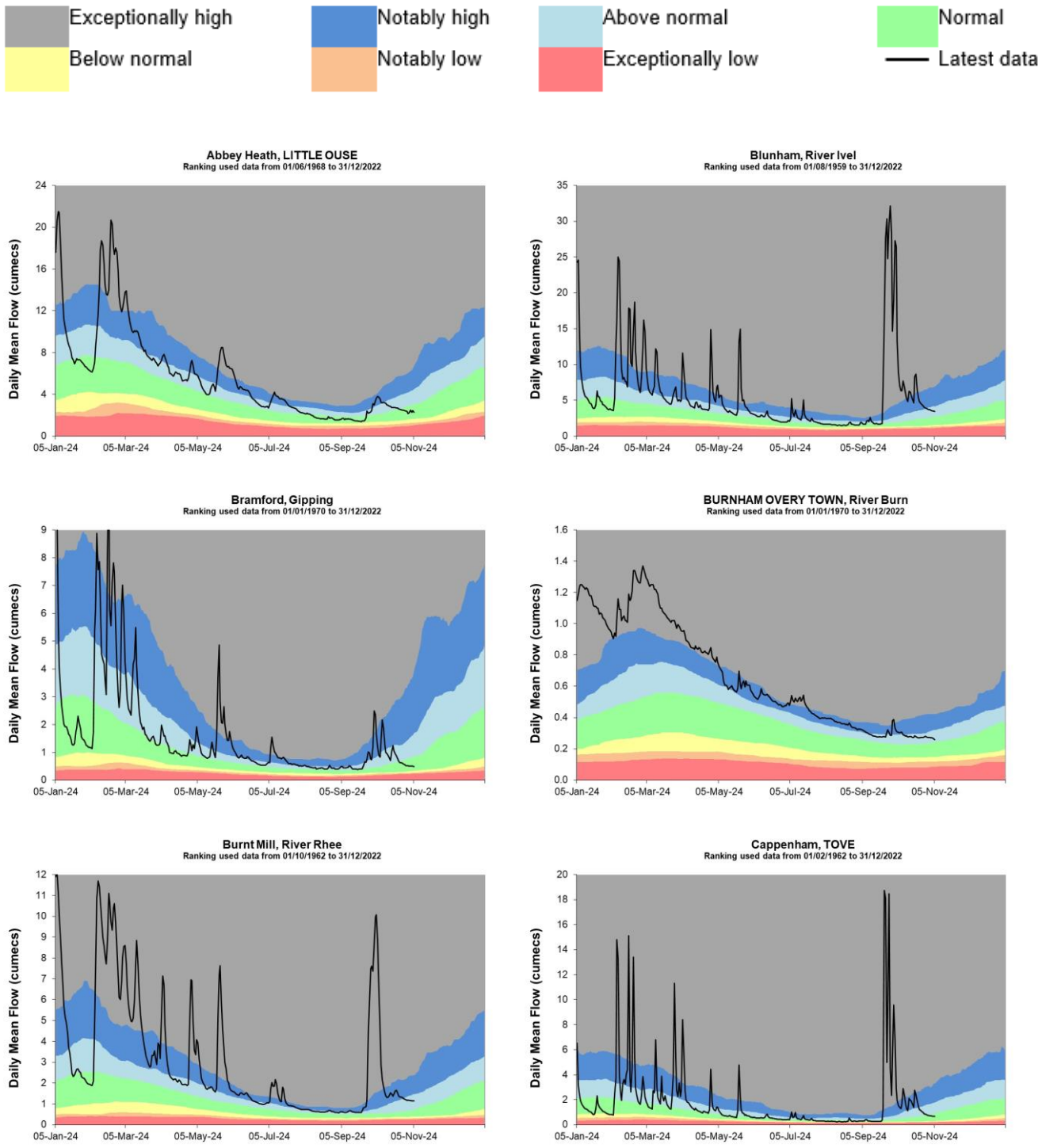
Figure 4.1: Monthly mean river flow for indicator sites for October 2024, expressed as a percentage of the respective long term average and classed relative to an analysis of historic September monthly means Table available in the appendices with detailed information.



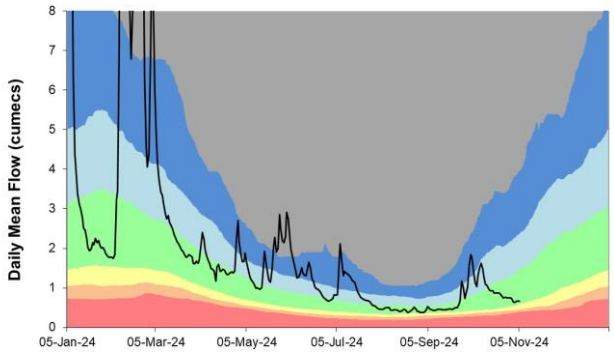
(Source: Environment Agency). Geological map reproduced with kind permission from UK Groundwater Forum, BGS copyright NERC. Crown copyright. All rights reserved. Environment Agency, 100024198, 2024.

4.2 River flow charts

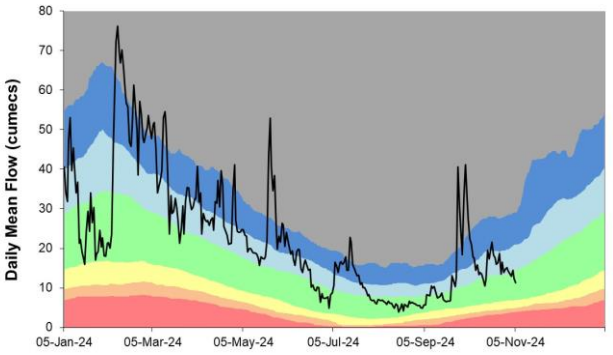
Figure 4.2: Daily mean river flow for index sites over the past year, compared to an analysis of historic daily mean flows, and long term maximum and minimum flows.



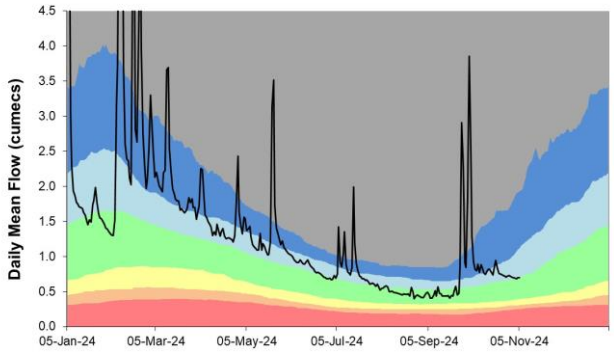
COLNEY, River Yare
Ranking used data from 01/01/1970 to 31/12/2022



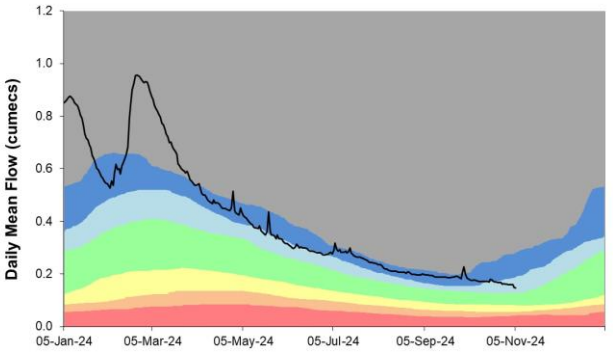
Denver, ELY OUSE
Ranking used data from 01/11/1971 to 31/12/2022



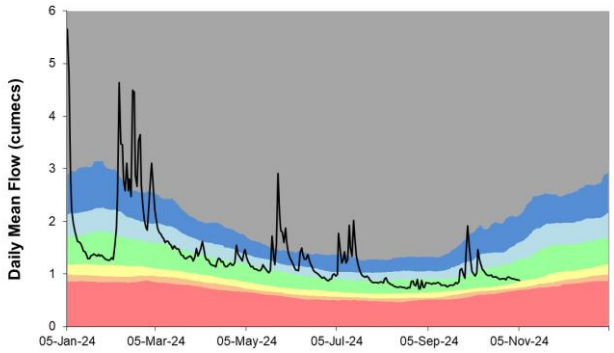
Dernford, CAM
Ranking used data from 21/02/1949 to 23/12/2022



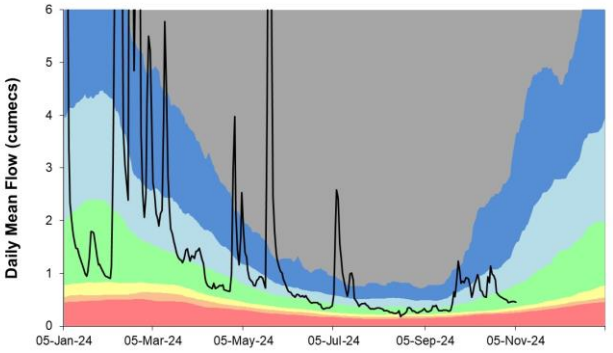
Heacham, HEACHAM
Ranking used data from 01/11/1965 to 31/12/2022



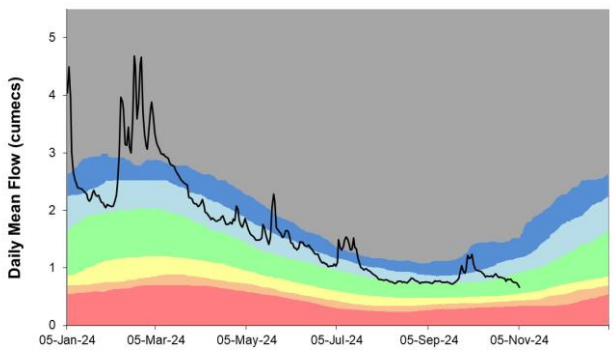
Ingworth, Bure
Ranking used data from 01/01/1970 to 31/12/2022



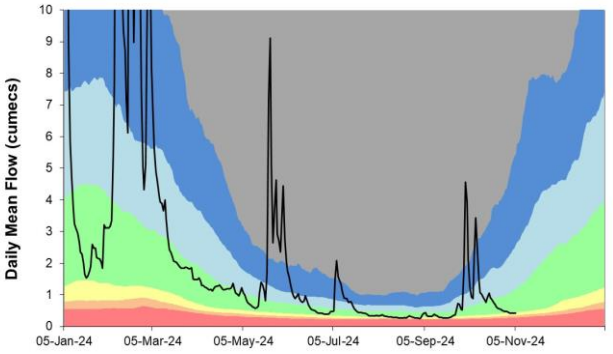
Lexden, Colne
Ranking used data from 01/01/1970 to 31/12/2022

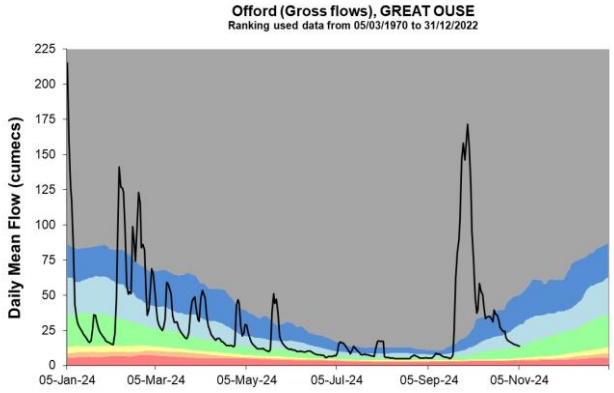


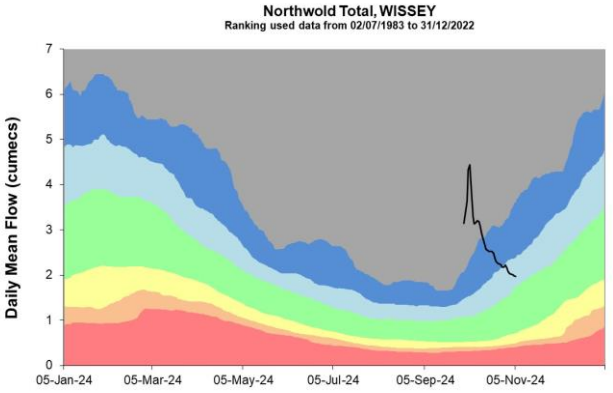
Marham, River Nar
Ranking used data from 01/09/1953 to 31/12/2022

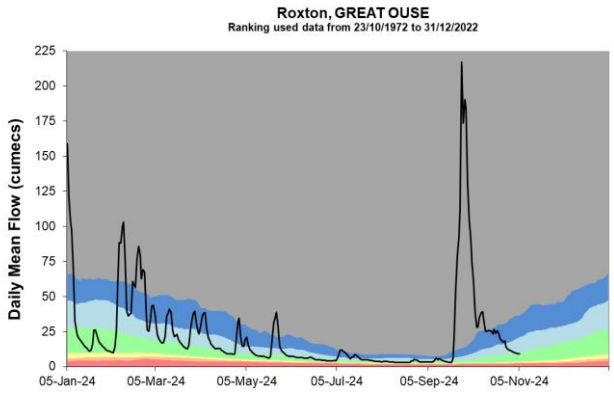


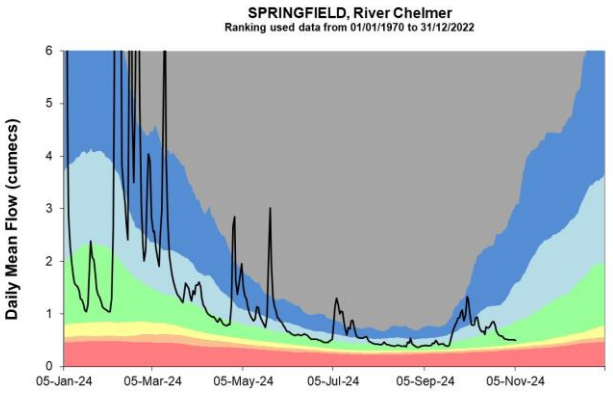
Needham Weir Total, Waveney
Ranking used data from 01/01/1970 to 31/12/2022

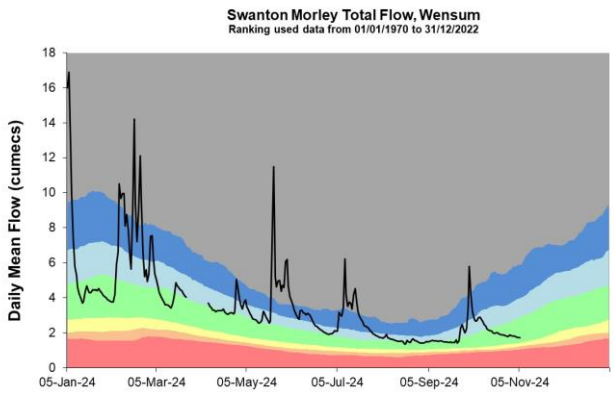


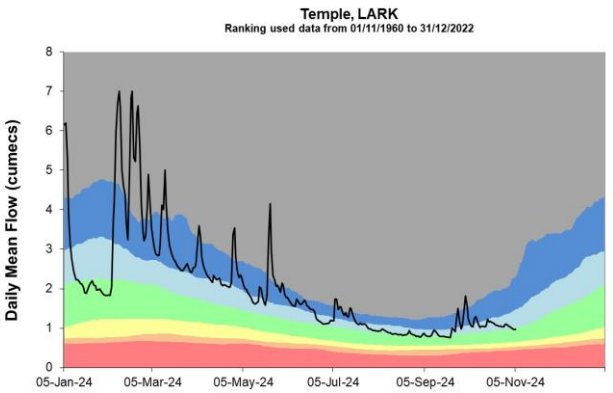


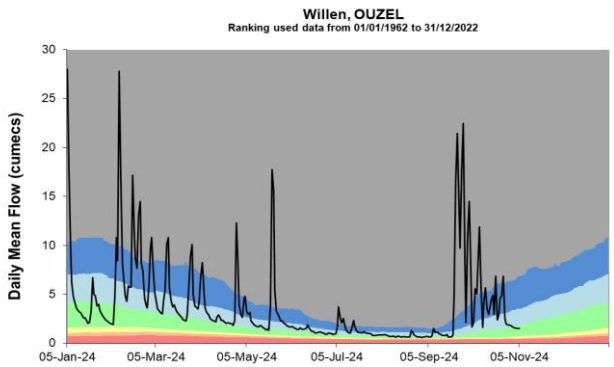










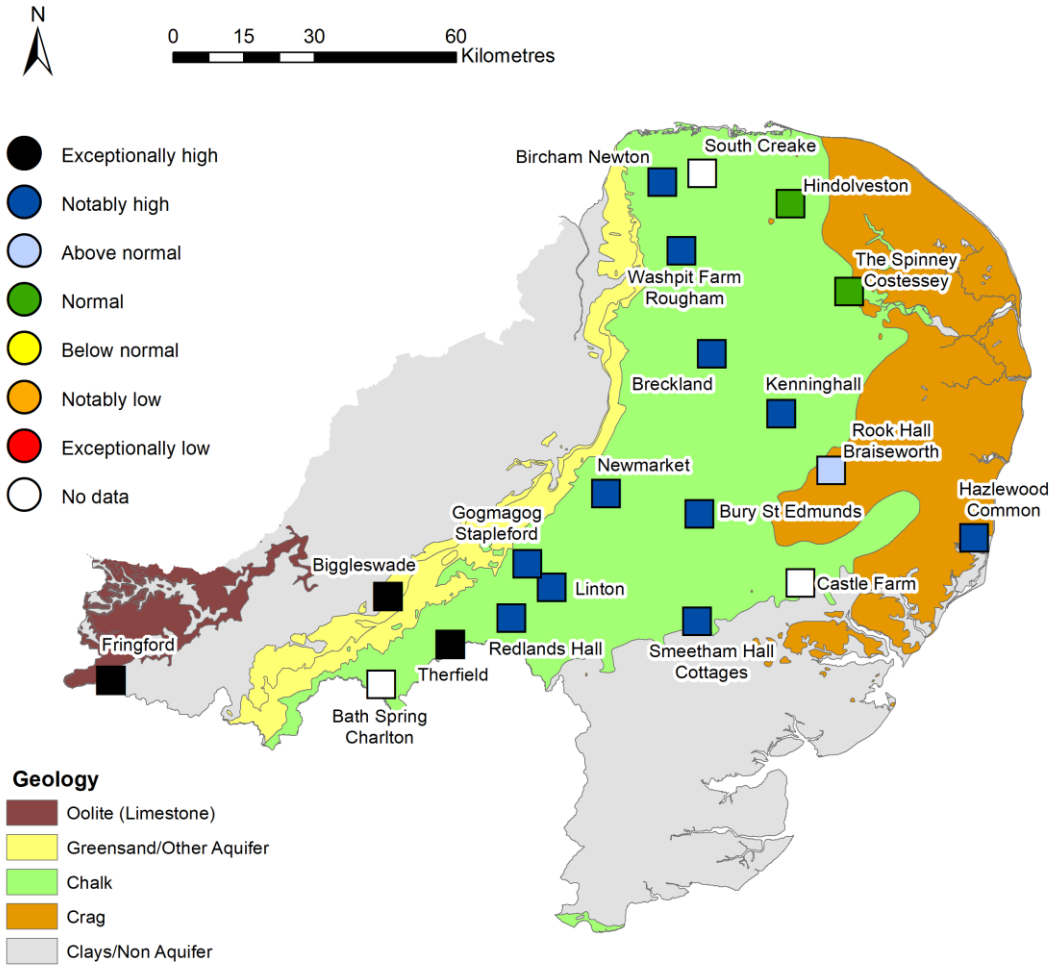


Source: Environment Agency.

5 Groundwater levels

5.1 Groundwater levels map

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



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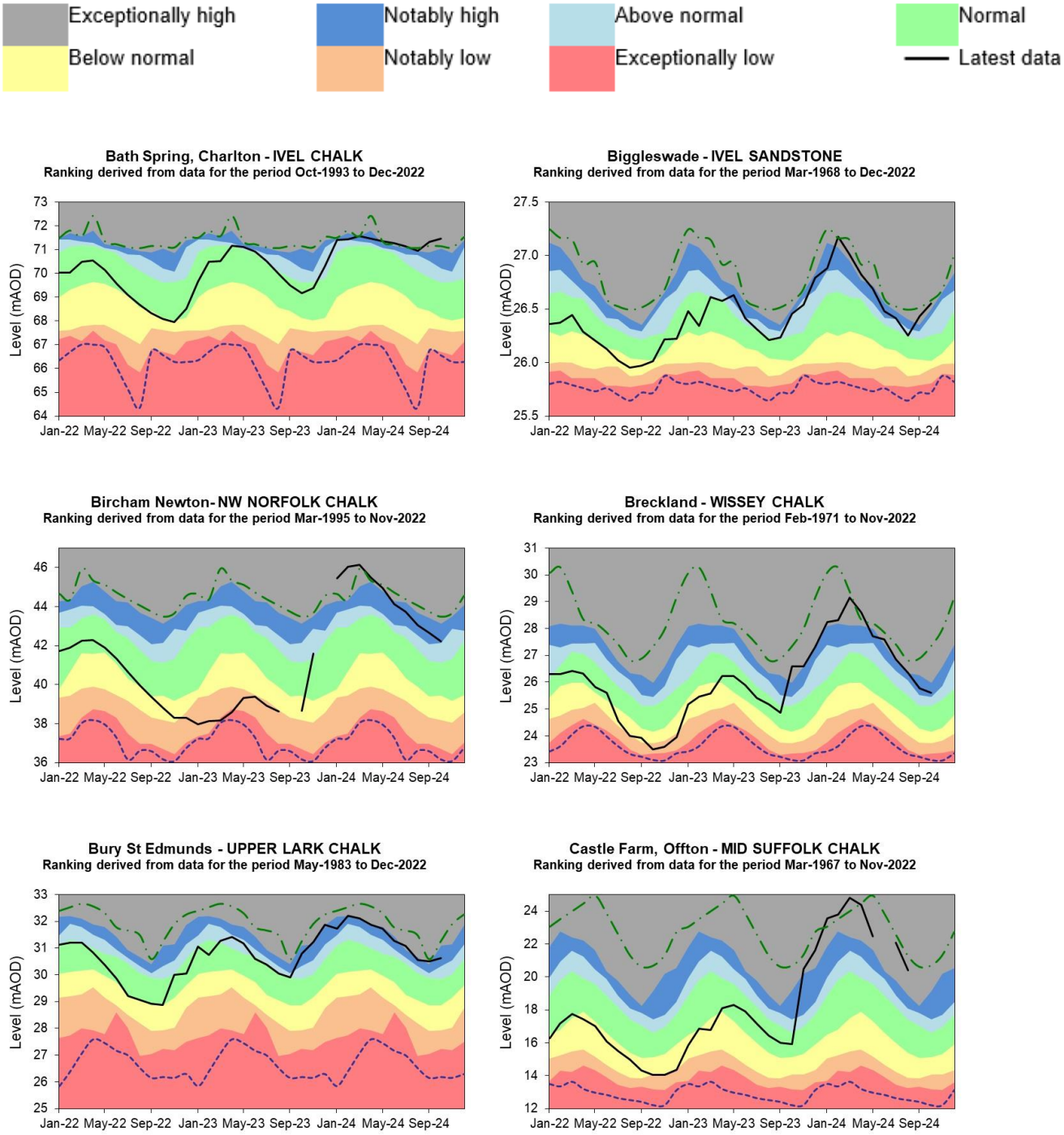
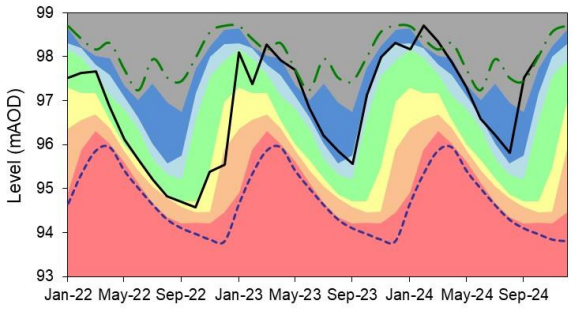
5.2 Groundwater level charts

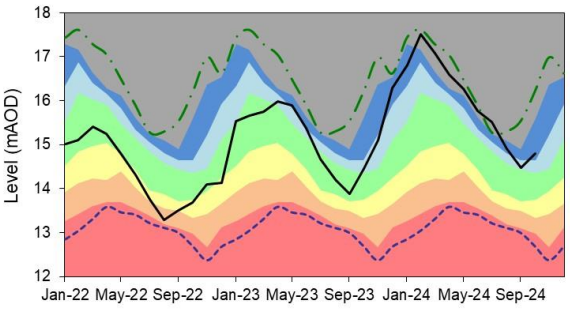
Figure 5.2: End of month groundwater levels at index groundwater level sites for major aquifers. 22 months compared to an analysis of historic end of month levels and long term maximum and minimum levels.



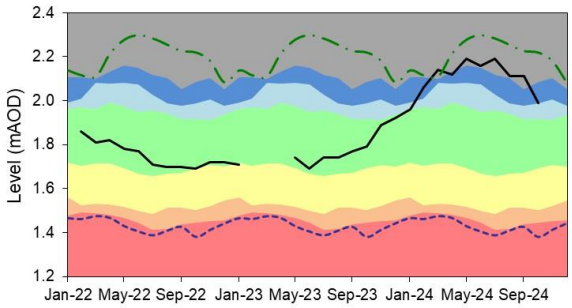
Fringford - GREAT OOLITE
Ranking derived from data for the period Sep-1980 to Dec-2022



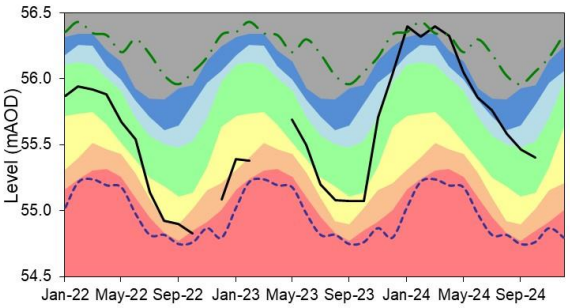
Gog Magog, Stapleford - CAM CHALK
Ranking derived from data for the period Jan-1980 to Dec-2022



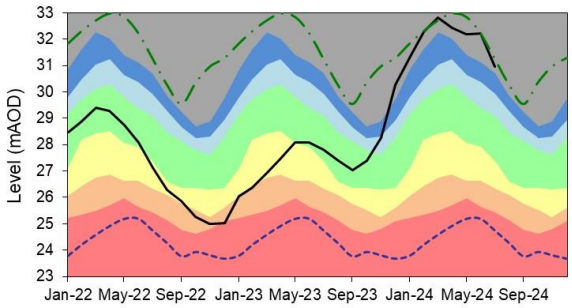
Hazlewood Common - SUFFOLK CRAG
Ranking derived from data for the period Oct-1988 to Nov-2022



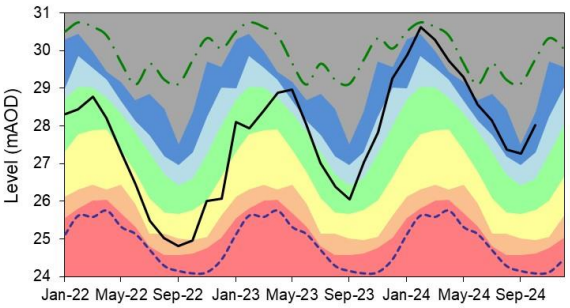
Hindolveston - NORFOLK CHALK
Ranking derived from data for the period Sep-1984 to Nov-2022



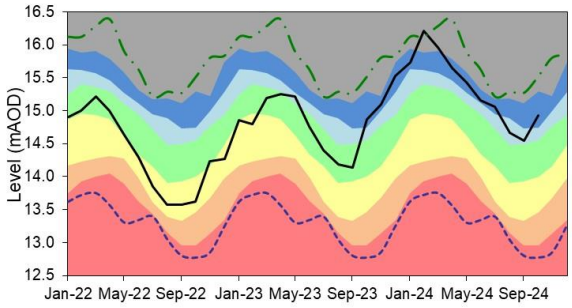
Kenninghall - LITTLE OUSE CHALK
Ranking derived from data for the period Aug-1973 to Dec-2022



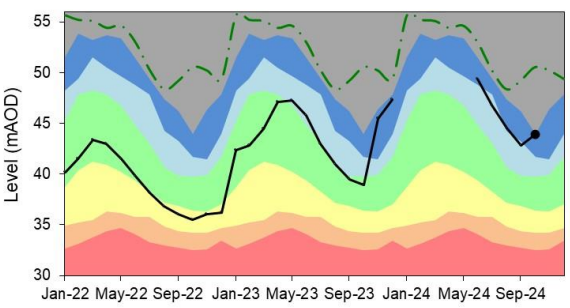
Linton- CAM CHALK
Ranking derived from data for the period Jan-1980 to Dec-2022

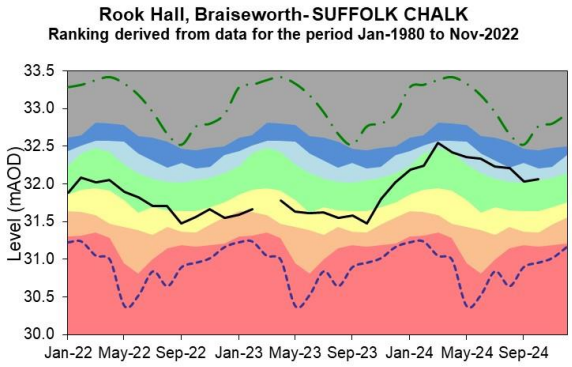


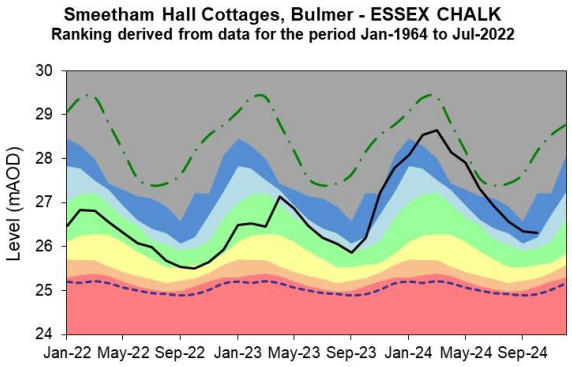
Newmarket - SNAIL CHALK
Ranking derived from data for the period Feb-1983 to Dec-2022

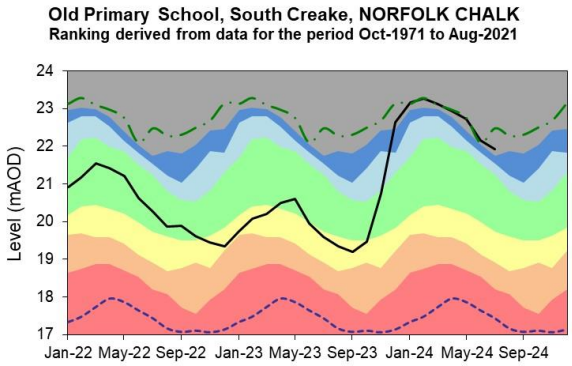


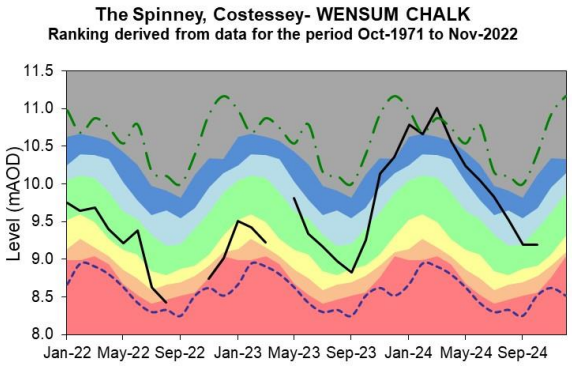
Redlands Hall, Ickleton - CAM CHALK
Ranking derived from data for the period Aug-1963 to Dec-2022

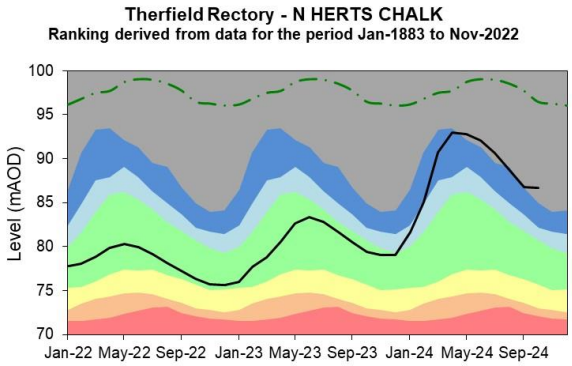


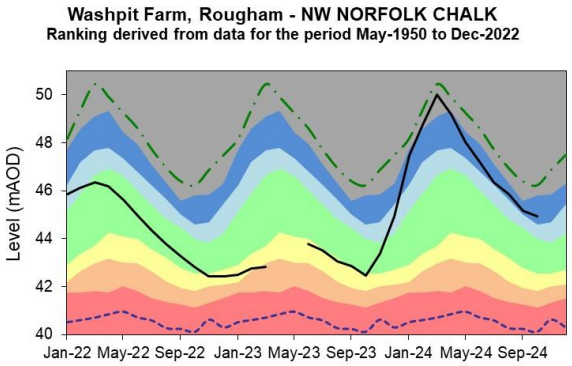








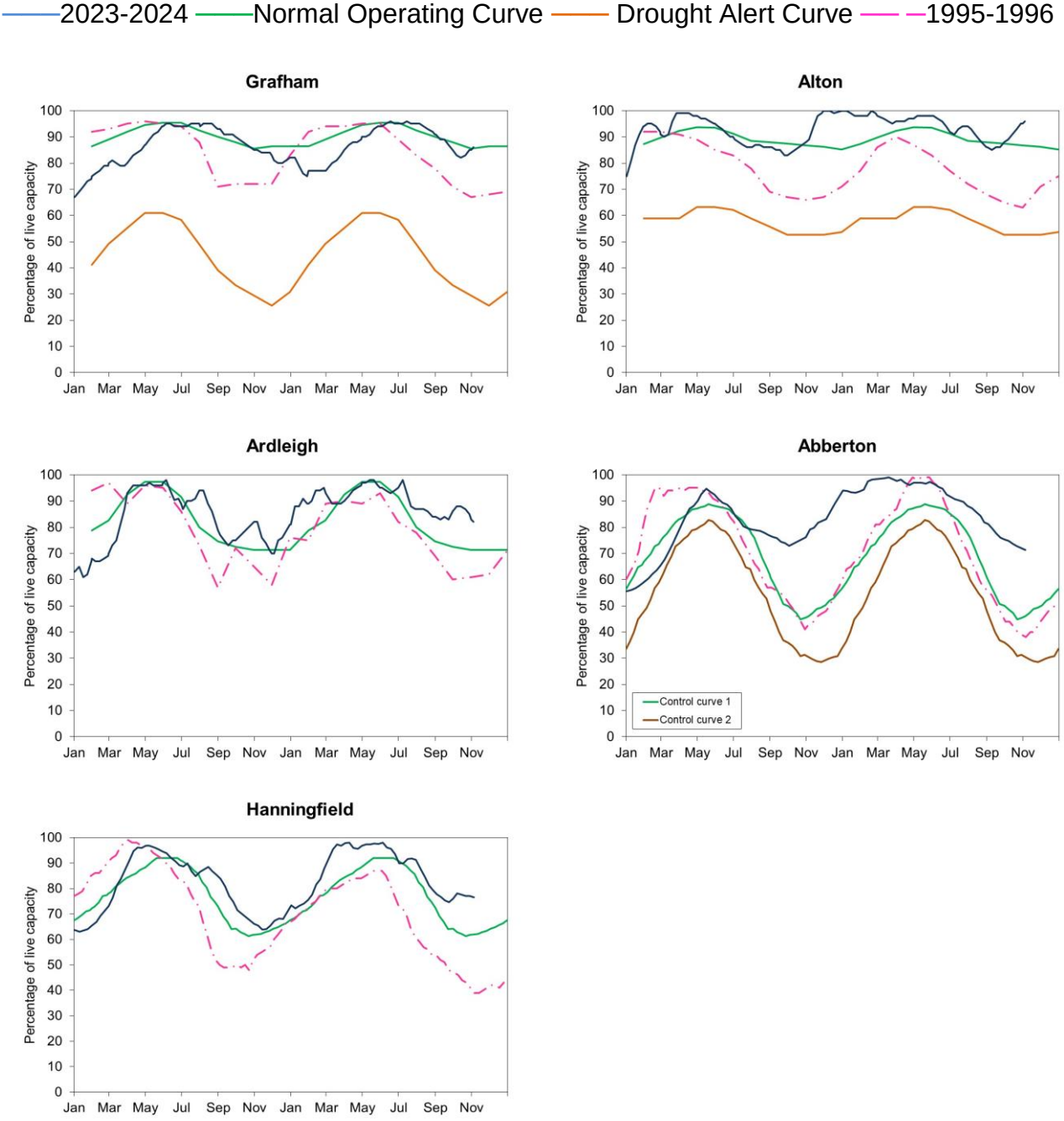




Source: Environment Agency, 2024.

6 Reservoir stocks

Figure 6.1: End of month regional reservoir stocks compared to the normal operating curve, drought curve and dry 1995-1996 stocks. Note: Historic records of individual reservoirs and reservoir groups making up the regional values vary in length.

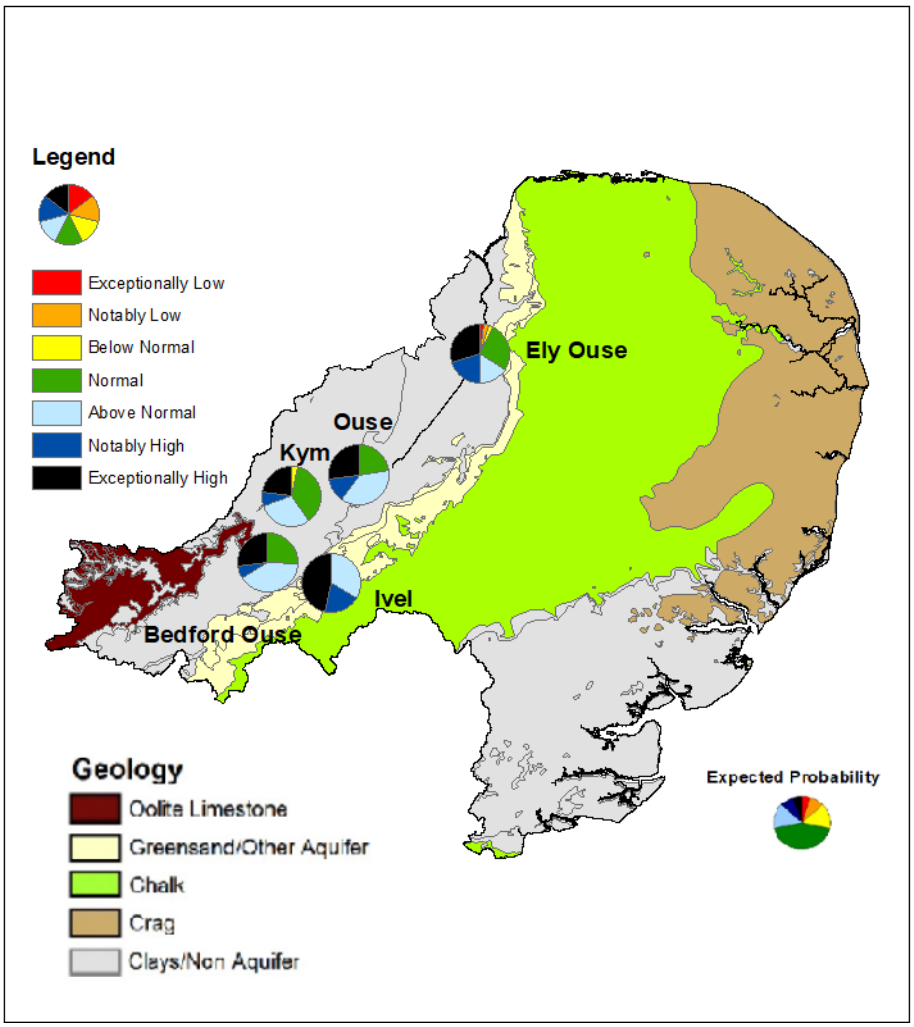


(Source: water companies).

7 Forward look

7.1 Probabilistic ensemble projection of river flows at key sites in December 2024

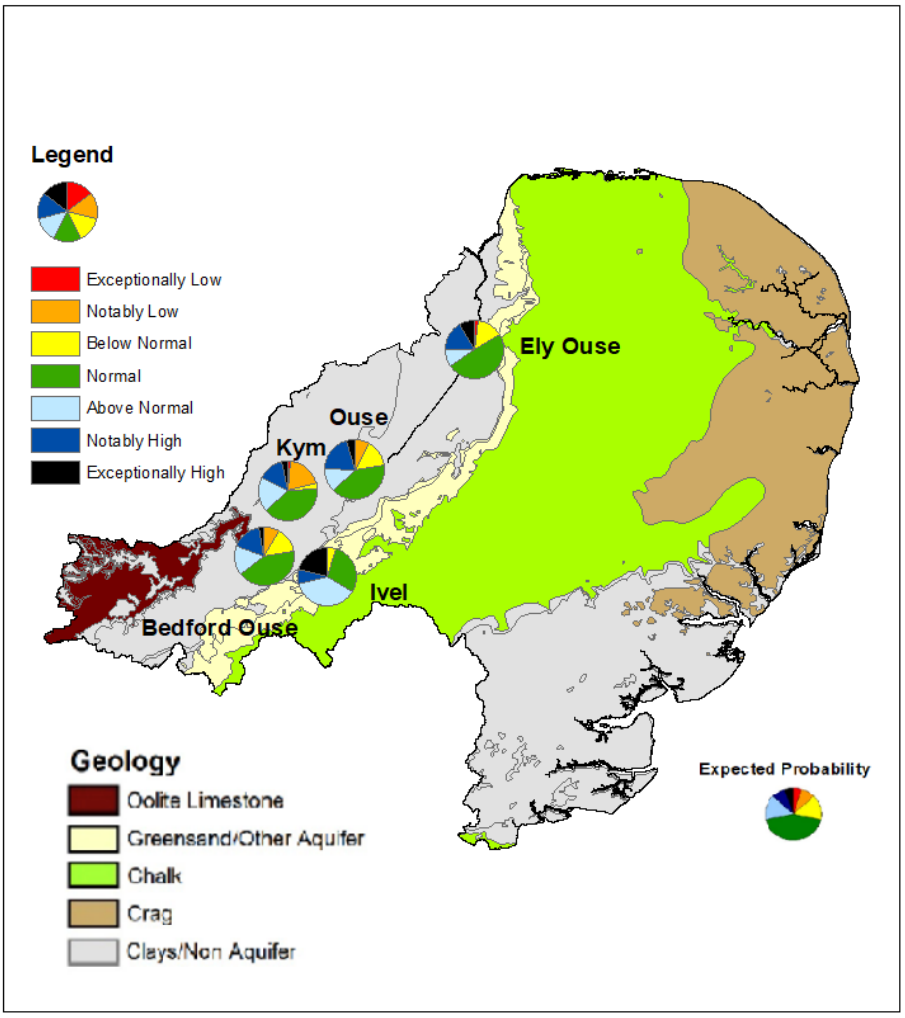
Table available in the appendices with detailed information. Exceptionally high or low levels are those which would typically occur 5% of the time within the historic record. Notably high or low levels are those which would typically occur 8% of the time. Above normal or below normal levels are those which would typically occur 15% of the time. Normal levels are those which would typically occur 44% of the time within the historic record.



Pie charts indicate probability, based on climatology, of the surface water flow at each site being, for example, exceptionally low for the time of year. (Source: Centre for Ecology and Hydrology, Environment Agency) Geological map reproduced with kind permission from UK Groundwater Forum, BGS © NERC. Crown copyright. All rights reserved. Environment Agency, 100026380, 2024.

7.2 Probabilistic ensemble projection of river flows at key sites in March 2025

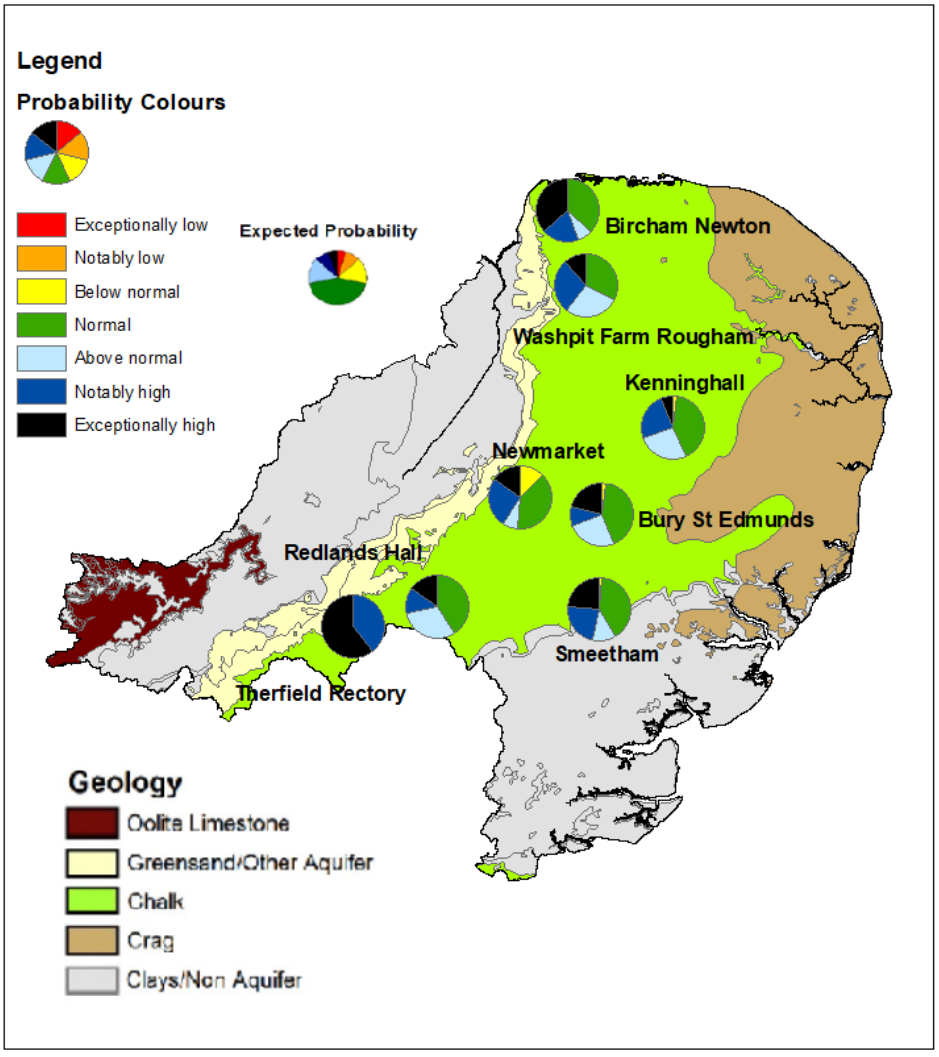
Table available in the appendices with detailed information. Exceptionally high or low levels are those which would typically occur 5% of the time within the historic record. Notably high or low levels are those which would typically occur 8% of the time. Above normal or below normal levels are those which would typically occur 15% of the time. Normal levels are those which would typically occur 44% of the time within the historic record.



Pie charts indicate probability, based on climatology, of the surface water flow at each site being, for example, exceptionally low for the time of year. (Source: Centre for Ecology and Hydrology, Environment Agency) Geological map reproduced with kind permission from UK Groundwater Forum, BGS © NERC. Crown copyright. All rights reserved. Environment Agency, 100026380, 2024

7.3 Probabilistic ensemble projection of groundwater levels at key sites in March 2025

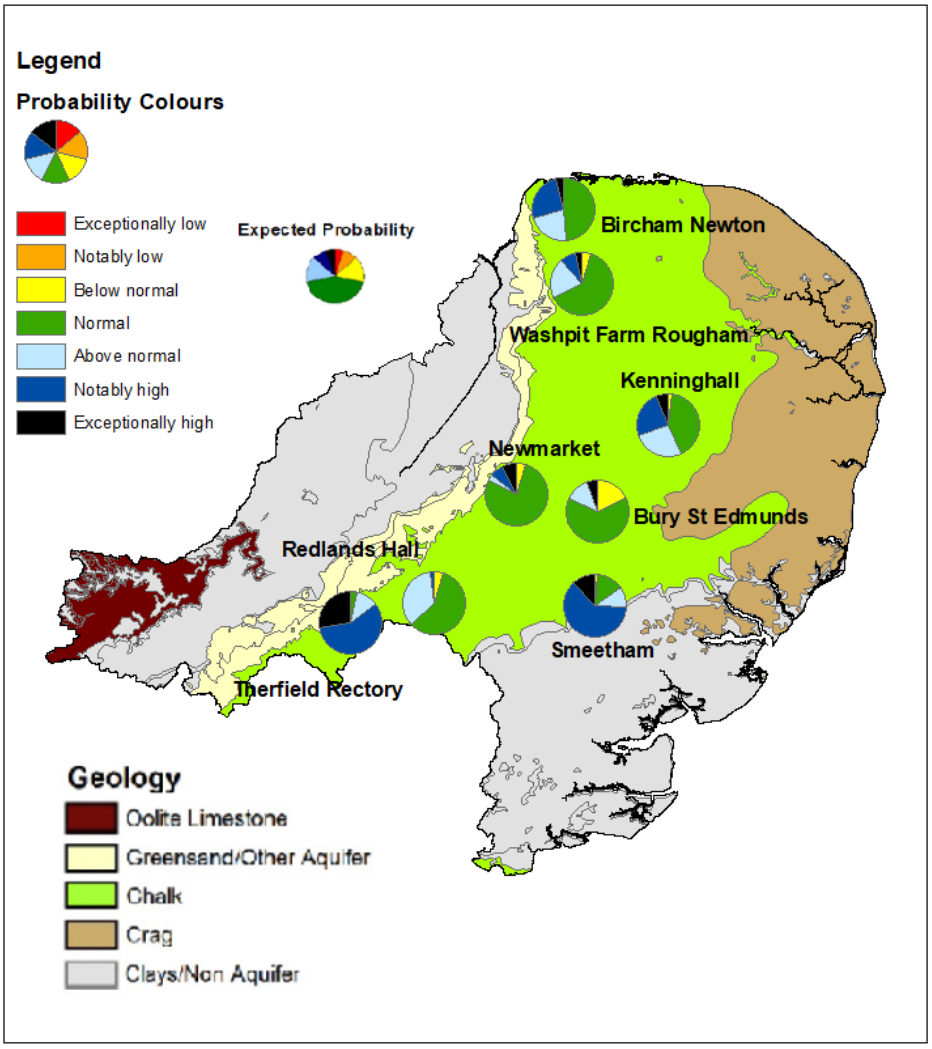
Table available in the appendices with detailed information. Exceptionally high or low levels are those which would typically occur 5% of the time within the historic record. Notably high or low levels are those which would typically occur 8% of the time. Above normal or below normal levels are those which would typically occur 15% of the time. Normal levels are those which would typically occur 44% of the time within the historic record.



Pie charts indicate probability, based on climatology, of the groundwater level at each site being, for example, exceptionally low for the time of year. (Source: Environment Agency)

7.4 Probabilistic ensemble projection of groundwater levels at key sites in September 2025

Table available in the appendices with detailed information. Exceptionally high or low levels are those which would typically occur 5% of the time within the historic record. Notably high or low levels are those which would typically occur 8% of the time. Above normal or below normal levels are those which would typically occur 15% of the time. Normal levels are those which would typically occur 44% of the time within the historic record.



Pie charts indicate probability, based on climatology, of the groundwater level at each site being, for example, exceptionally low for the time of year. (Source: Environment Agency)

8 Glossary

8.1 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).

8.2 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.

9 Appendices

9.1 Rainfall table

Hydrological area	October 2024 rainfall % of long term average 1961 to 1990	Oct 2024 band	Aug 2024 to October cumulative band	May 2024 to October cumulative band	Nov 2023 to October cumulative band
Broadland Rivers	99	Normal	Normal	Normal	Notably high
Cam	114	Normal	Normal	Above normal	Exceptionally high
Central Area Fenland	131	Normal	Normal	Above normal	Exceptionally high
East Suffolk	130	Normal	Normal	Normal	Notably high
Little Ouse And Lark	111	Normal	Normal	Normal	Exceptionally high
Lower Bedford Ouse	123	Normal	Notably high	Notably high	Exceptionally high
North Essex	103	Normal	Normal	Normal	Notably high
North Norfolk	81	Normal	Normal	Normal	Notably high
Nw Norfolk And Wissey	109	Normal	Normal	Normal	Exceptionally high
South Essex	114	Normal	Normal	Normal	Above normal

Upper Bedford Ouse	124	Normal	Exceptionally high	Notably high	Exceptionally high

9.2 River flows table

Site name	River	Catchment	Oct 2024 band	Sep 2024 band
Abbey Heath	Little Ouse	Little Ouse	Above normal	Normal
Blunham	Ivel	Ivel	Exceptionally high	Exceptionally high
Bramford	Gipping	Gipping	Above normal	Above normal
Burnham Overy	Burn	Burn	Above normal	Notably high
Burnt Mill	Rhee	Rhee	Exceptionally high	Exceptionally high
Cappenham	Tove	Tove	Exceptionally high	Exceptionally high
Colney	Yare	Yare	Normal	Normal
Denver	Ely Ouse	Cutoff and Renew Channel	Notably high	Notably high
Dernford	Cam	Cam	Notably high	Notably high
Heacham	Heacham	Heacham	Notably high	Notably high
Ingworth	Bure	Bure	Normal	Normal
Lexden	Colne	Colne Essex	Normal	Above normal
Marham	Nar	Nar	Above normal	Above normal

Needham Weir Total	Waveney (lower)	Waveney	Above normal	Normal
Northwold Total	Wissey	Wissey	Notably high	
Offord (gross Flows)	Great Ouse	Ouse Beds	Exceptionally high	Exceptionally high
Roxton	Great Ouse	Ivel	Exceptionally high	Exceptionally high
Springfield	Chelmer	Chelmer Upper	Above normal	Above normal
Swanton Morley Total	Wensum	Wensum	Normal	Above normal
Temple	Lark	Lark	Above normal	Above normal
Willen	Ouzel	Ouzel	Exceptionally high	Exceptionally high

9.3 Groundwater table

Site name	Aquifer	End of Oct 2024 band	End of Sep 2024 band
Biggleswade	Ivel Woburn Sands	Exceptionally high	Exceptionally high
Bircham Newton	North West Norfolk Chalk	Notably high	Notably high
Breckland	Wissey Chalk	Notably high	Notably high
Bury St Edmunds	Upper Lark Chalk	Notably high	Exceptionally high
Castle Farm, Offton	East Suffolk Chalk		
Gog Magog, Stapleford	Cam Chalk	Notably high	Above normal
Hazlewood Common	East Suffolk Crag	Notably high	Exceptionally high
Hindolveston	Norfolk Chalk	Normal	Normal
Kenninghall	Little Ouse Chalk	Notably high	
Linton	Cam Chalk	Notably high	Notably high
Newmarket	Snail Chalk	Notably high	Above normal
Old Primary School, South Creake	North Norfolk Chalk		

Redlands Hall, Ickleton	Cam Chalk	Notably high	Above normal
Rook Hall, Braiseworth	East Suffolk Chalk	Above normal	Above normal
Smeetham Hall Cottages, Bulmer	North Essex Chalk	Notably high	Notably high
The Spinney, Costessey	Wensum Chalk	Normal	Normal
Washpit Farm, Rougham	North West Norfolk Chalk	Notably high	Notably high
Therfield Rectory	Upper Lee Chalk	Exceptionally high	Notably high
Fringford P.s.	Upper Bedford Ouse Oolitic Limestone (great)	Exceptionally high	Exceptionally high

9.4 Ensemble projections tables

9.4.1 Probabilistic ensemble projection of river flows at key sites in December 2024

Percentage of pie chart for each band

Site	Bedford Ouse	Kym	Ivel	Ouse	Ely Ouse
Exceptionally low	0	0	0	0	2
Notably low	0	0	0	0	2
Below normal	0	3	0	0	2
Normal	26	37	0	23	27
Above normal	40	29	34	37	16
Notably high	6	8	19	13	20
Exceptionally high	27	23	47	27	30

9.4.2 Probabilistic ensemble projection of river flows at key sites in March 2025

Percentage of pie chart for each band

Site	Bedford Ouse	Kym	Ivel	Ouse	Ely Ouse
Exceptionally low	0	2	0	0	2
Notably low	8	19	0	8	0
Below normal	15	3	5	15	14
Normal	42	39	29	40	50
Above normal	16	19	37	13	9
Notably high	16	15	8	19	16
Exceptionally high	3	3	21	5	9

9.4.3 Probabilistic ensemble projection of groundwater levels at key sites in March 2025

Percentage of pie chart for each band

Site	Therfield Rectory	Redlands Hall	Newmarket	Washpit Farm	Bircham Newton	Kenninghall	Bury St Edmunds	Smeetham
Exceptionally low	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Notably low	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Below normal	0.0	0.0	12.8	0.0	0.0	2.0	2.6	1.7
Normal	0.0	40.7	38.5	32.8	37.0	40.8	41.0	39.7
Above normal	0.0	30.5	7.7	27.9	7.4	26.5	25.6	12.1
Notably high	39.3	13.6	25.6	27.9	18.5	24.5	10.3	22.4
Exceptionally high	60.7	15.3	15.4	11.5	37.0	6.1	20.5	24.1

9.4.4 Probabilistic ensemble projection of groundwater levels at key sites in September 2025

Percentage of pie chart for each band

Site	Therfield Rectory	Redlands Hall	Newmarket	Washpit Farm	Bircham Newton	Bury St Edmunds	Smeetham
Exceptionally low	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Notably low	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Below normal	0.0	5.1	4.9	4.9	0.0	17.9	1.7
Normal	3.3	57.6	78.0	62.3	48.1	64.1	13.8
Above normal	11.5	35.6	2.4	21.3	22.2	12.8	10.3
Notably high	57.4	1.7	7.3	8.2	25.9	0.0	62.1
Exceptionally high	27.9	0.0	7.3	3.3	3.7	5.1	12.1