Monthly water situation report: Hertfordshire and North London Area

1 Summary - September 2024

September saw exceptionally high rainfall (243% of LTA) in Hertfordshire and North London, making it the second wettest September on record. The month was fairly dry until 22 September, when intense rainfall caused rapid drops in soil moisture deficits and significant river flow increases. Groundwater level trends varied but all observation boreholes remained in the exceptionally high band. Several sites recorded their highest September levels on record for rainfall, river flows, and groundwater. Not only was it the second wettest September, but this water year (October 2023 to September 2024) has been the second wettest on record, with rainfall above the long term average in most months.

1.1 Rainfall

September was characterised by exceptionally high rainfall across the Hertfordshire and North London area ("the Area"). The Area received 133mm of rainfall, which was 43% of the long term average (LTA). This made September 2024 the second wettest September on record for the Area (records start in 1871), surpassed only by September 1896, which had 158mm of rainfall. It was also the Area's ninth wettest month ever recorded dating back to 1871, out of a total of 1,845 months. During the same period, the Lee Chalk experienced the third wettest month on record.

In addition, the Lee Chalk and the Chilterns East Colne had their wettest Septembers on record, following the records set in 1896. These areas and North London were in the exceptionally high rainfall band while Lower Lee and Roding were in the notably high band.

The month started relatively dry with only 44mm recorded between 1 and 21 September. The dry spell was dramatically broken on 22 September with the month's heaviest rainfall. On that day, Markyate (Chilterns East Colne) recorded the highest rainfall of 87mm and Whitwell (Lee Chalk) recorded a total of 86mm with the highest hourly intensity reaching 30.66mm. During this extreme rainfall, nearly half of the daily total fell within a 90 minute period.

The exceptional rainfall in September contributed to broader trends observed throughout the water year (October 2023 to September 2024). This water year was the second wettest year on record for the Area, following 2001 (based on records dating back to 1871). Over the last 12 months, the Area consistently received greater than the LTA rainfall every month except June and August.

1.2 Soil moisture deficit and recharge

Soil moisture deficits (SMD) dropped rapidly after the rainfall on 22 September, leading to unusually early soil saturation in some areal rainfall units. Chilterns East Colne began the month with an SMD of 95mm which dropped to zero by 26 September. Similarly, Lee Chalk started

September with an SMD of 99mm and ended the month with a deficit of just 3mm. These chalk units received significant amounts of effective rainfall, well above the LTA. In contrast, North London, Lower Lee, and Roding experienced zero effective rainfall, despite the heavy precipitation. SMD levels dropped significantly but a meaningful level remained at the end of the month across these areas.

1.3 River flows

There were significant increases in river base flows across the Area in September, driven by the exceptionally high rainfall totals and high groundwater levels. The majority of sites recorded flows in the exceptionally high band for September with the exception of Brent Monks Park and Wareside Mardock which recorded flows in the notably high band, and Redbridge which was in the above normal band.

The monthly mean flows were the highest on record at a number of stations, including, the:

- River Ver at Colney Street (records began 1956)
- River Mimram at Panshanger (records began 1952)
- River Lee at Howe Green (records began 1959
- River Crane at Cranford (records began 1978)
- River Colne at Denham Colne (records began 1952)

Notable peaks were seen following the intense rainfall on 22 September at all sites which led to 13 flood alerts on the 22 September, 8 on 23 September, and a further 15 towards the end of that week.

Three flood warnings were also issued, the:

- River Lee at Luton on 22 September
- River Lee at Harpenden on 23 September
- Yeading Brook East at South Ruislip on 23 September

1.4 Groundwater levels

Groundwater levels increased at Amersham Road, Ashley Green, and Lilley Bottom. In contrast, the remaining groundwater indicator sites responded to the heavy rainfall with increases in groundwater level but overall they ended the month with levels lower than they started. Despite the variation in trends, all groundwater sites recorded levels in the exceptionally high band for September.

Wapseys Wood, Lilley Bottom, and Amersham Road all recorded their highest September levels since the start of their records in 1988, 1979, and 1991 respectively. Hixham Hall and Ashley Green were not far behind, measuring their second highest September levels since the start of their records in 1964 and 1987 respectively.

1.5 Reservoir stocks

September saw minor changes in reservoir levels. Lower Thames increased slightly from 79% to 80% of live capacity, while Lee Valley decreased from 96% to 94%. Both remained above their LTA for September.

1.6 Environmental impact

Most of the sources of chalk rivers in the Colne catchment moved downstream of their locations in September, the:

- River Ver started flowing below Markyate
- River Gade started flowing downstream of Hudnall Corner
- source of the River Bulbourne started flowing downstream of Dudswell village
- source of the River Chess remained just upstream of Chesham
- River Misbourne was flowing along its full length from Great Missenden

Most of the chalk river sources in the Upper Lee catchment stayed in similar locations compared to August, the:

- River Mimram started flowing just above Whitwell
- River Beane started flowing around Walkern
- source of the River Rib remained just above Buntingford
- River Ash (Herts) started flowing upstream of Hadham Ford
- River Stort started flowing at Stansted Springs

To protect the environment, during September a number of abstraction licence flow constraints were in force. This ranged between 1 and 9 per week, out of a winter maximum of 35.

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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 30 September 2024), classed relative to an analysis of respective historic totals. Table available in the appendices with detailed information.

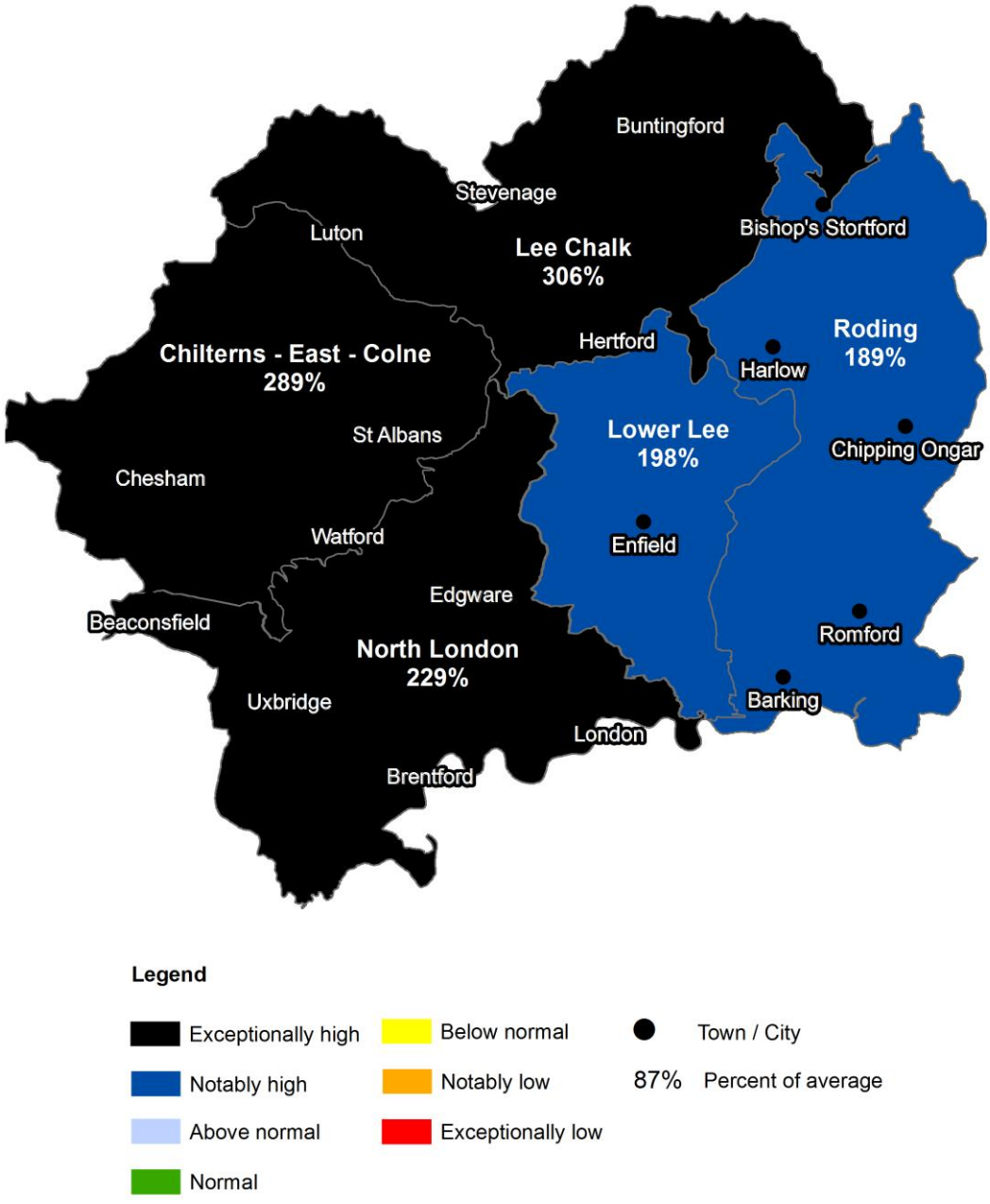
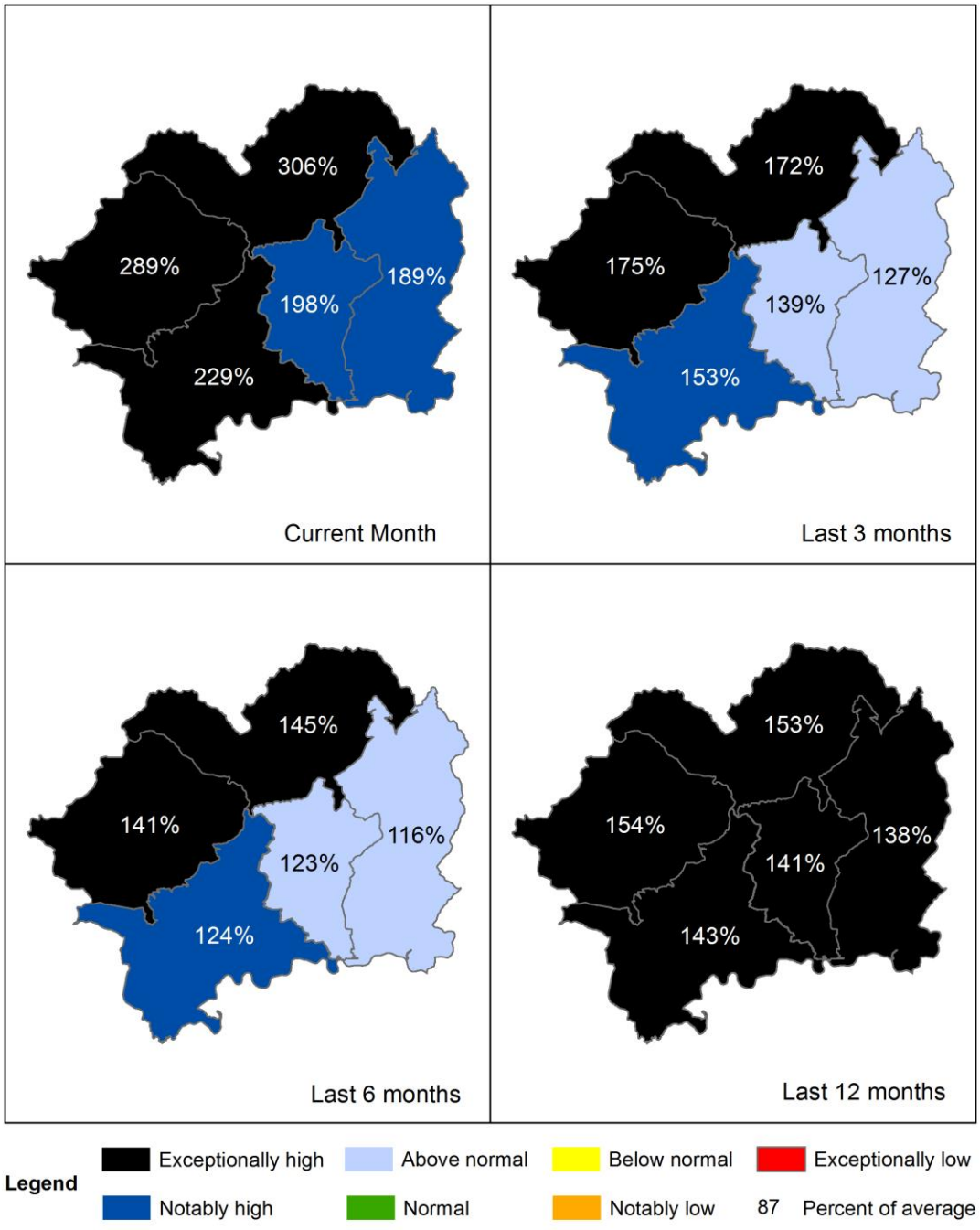


Figure 2.2: Total rainfall for hydrological areas for the current month (up to 30 September 2024), the last 3 months, the last 6 months, and the last 12 months, classed relative to an analysis of respective historic totals. Table available in the appendices with detailed information.

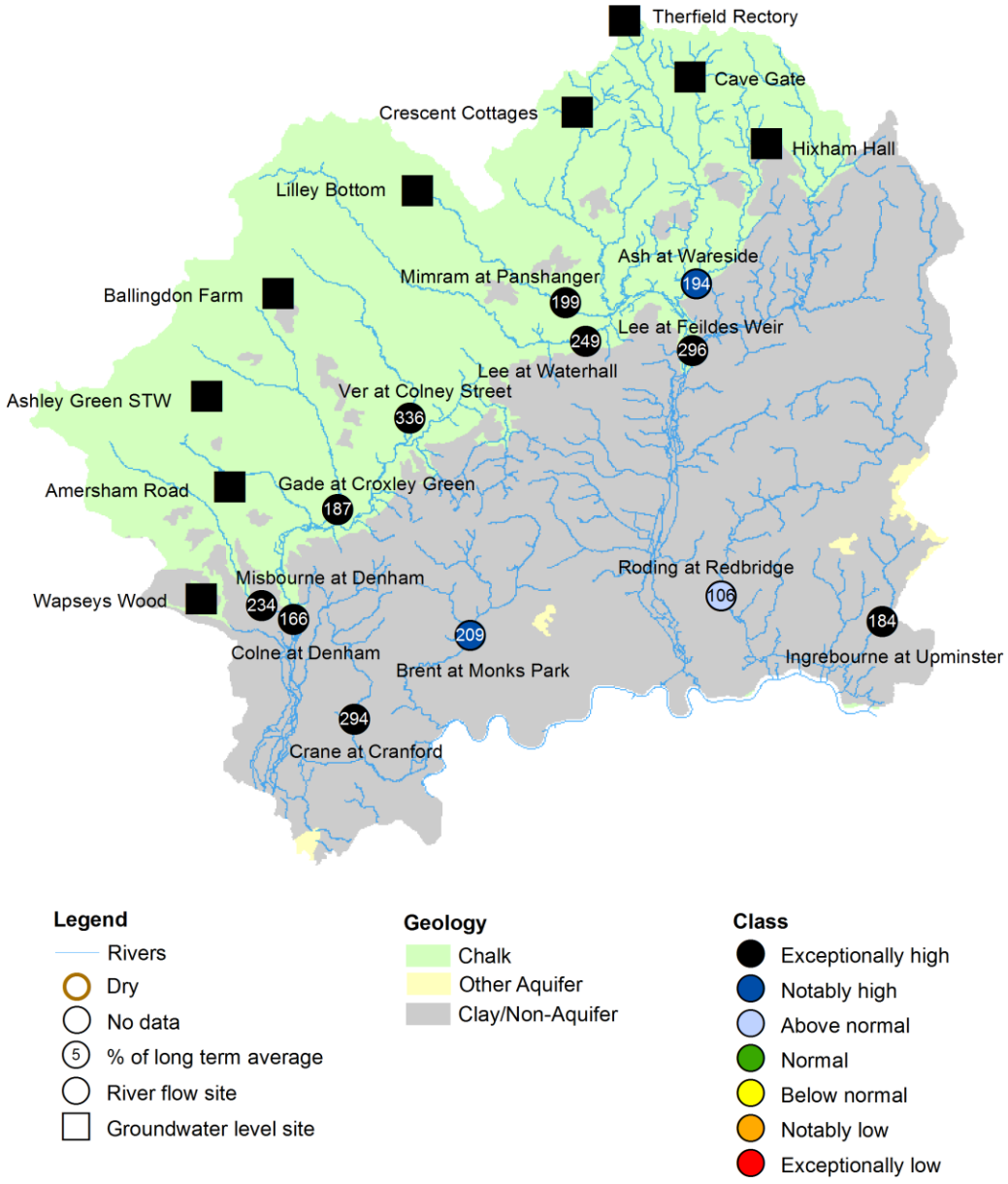


HadUK data based on the Met Office 1km gridded rainfall dataset derived from rain gauges (Source: Met Office. Crown copyright, 2024). Provisional data based on Environment Agency 1km gridded rainfall dataset derived from Environment Agency intensity rain gauges. Crown copyright. All rights reserved.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

3 River flows and Groundwater levels

3.1 River flows and Groundwater level map

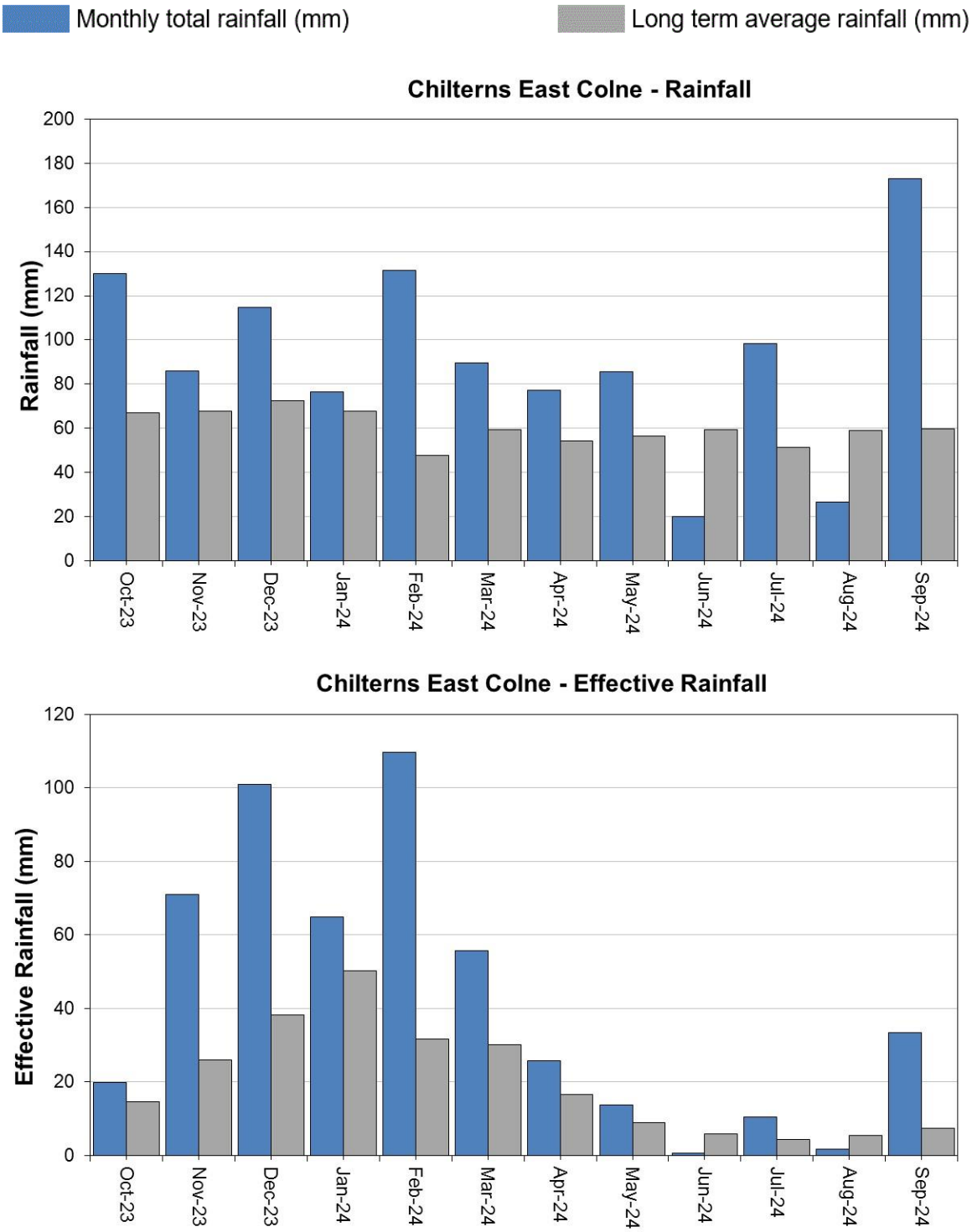
Figure 3.1: Monthly mean river flow and groundwater levels at our indicator sites for September 2024, expressed as a percentage of the respective long term average and classed relative to an analysis of historic September monthly means. Table available in the appendices with detailed information.



4 Colne Catchment

4.1 Colne Rainfall and effective rainfall charts

Figure 4.1: Monthly rainfall and effective rainfall totals for the past 12 months compared to the 1961 to 1990 long term average for the Colne.

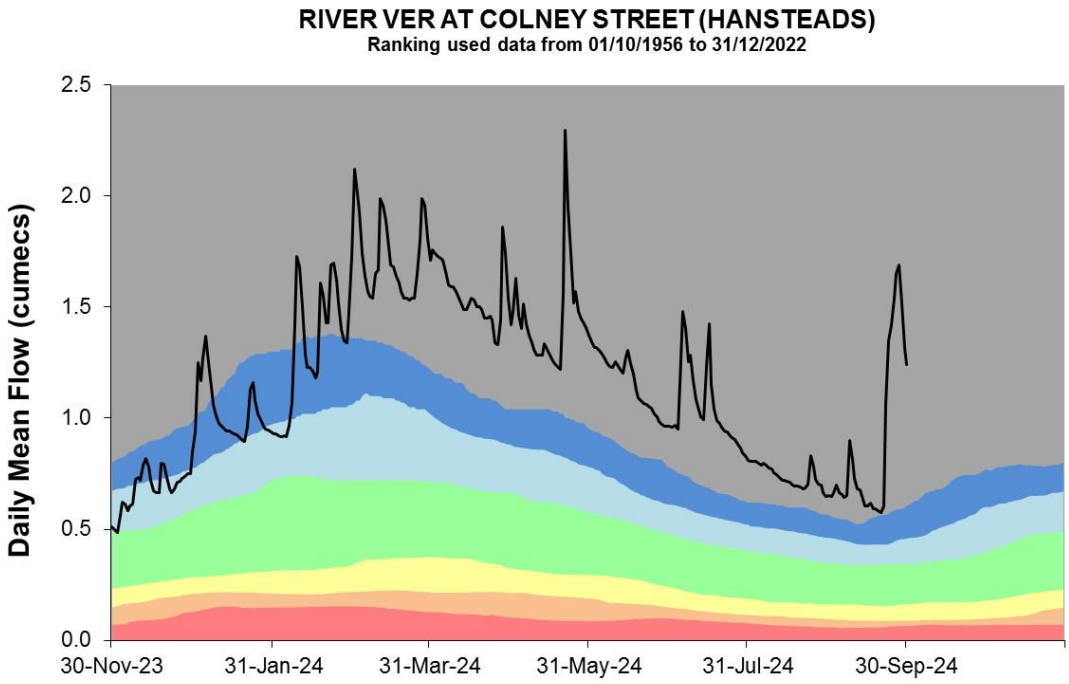


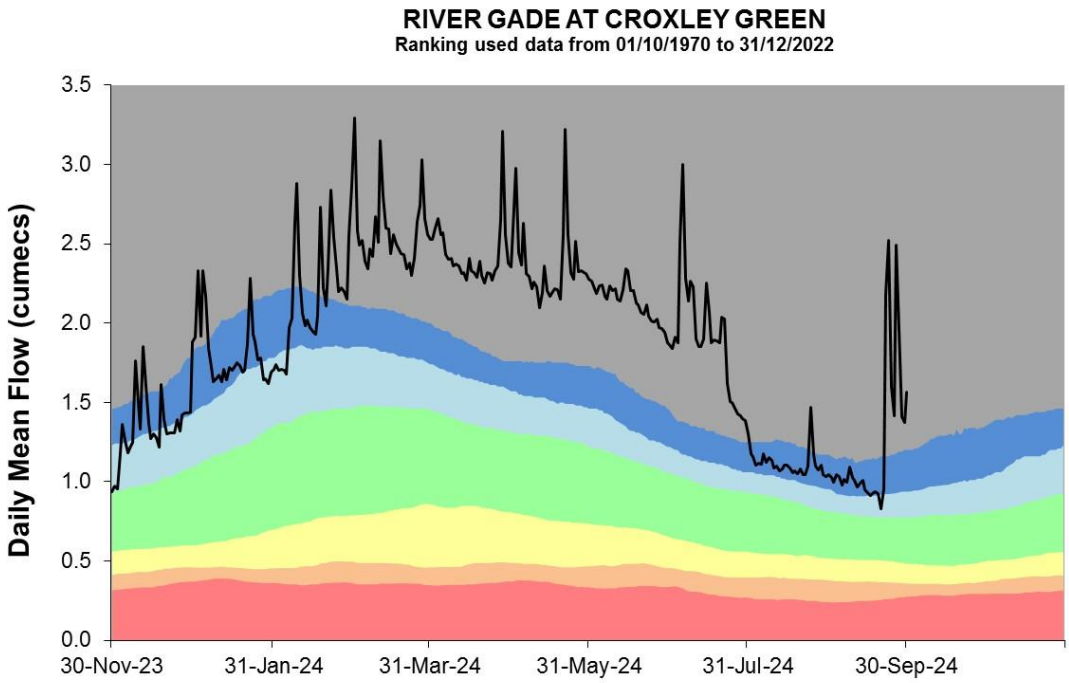
HadUK rainfall data (Source: Met Office. Crown copyright, 2024)

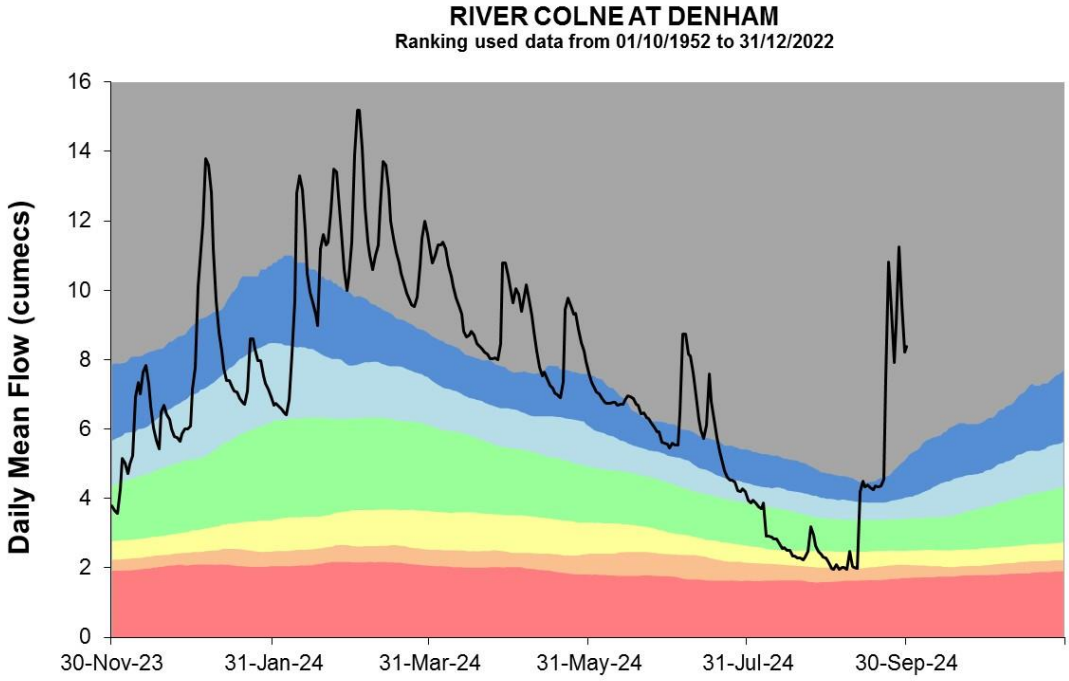
EA Soil Moisture Model effective rainfall data (Source: Environment Agency, 2024)

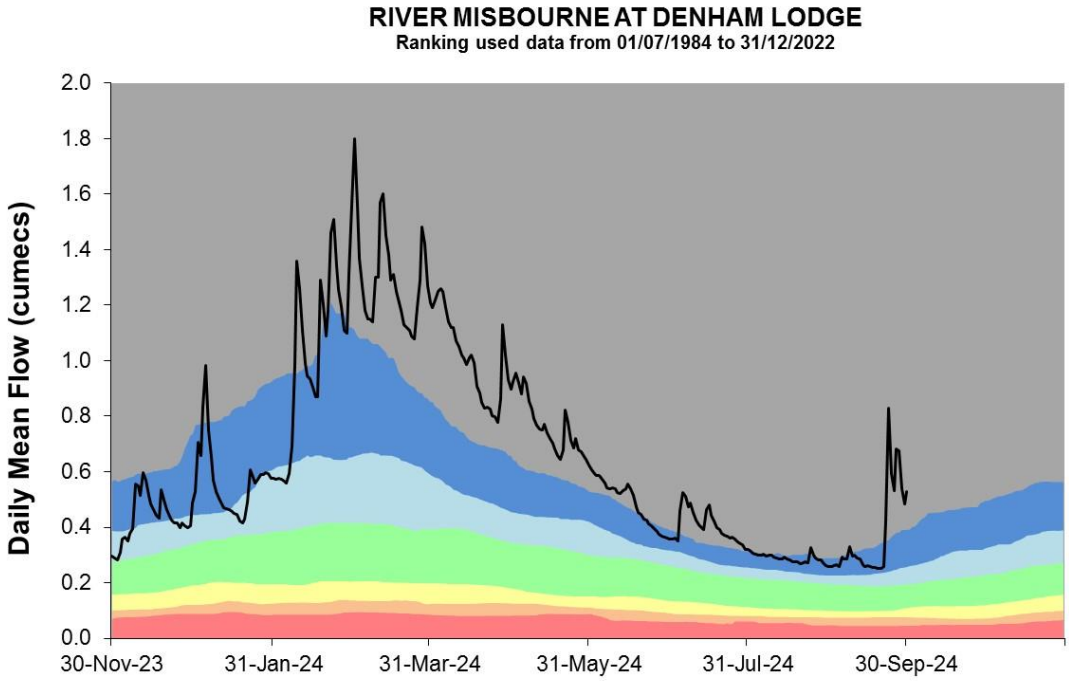
4.2 Colne River flow charts

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.





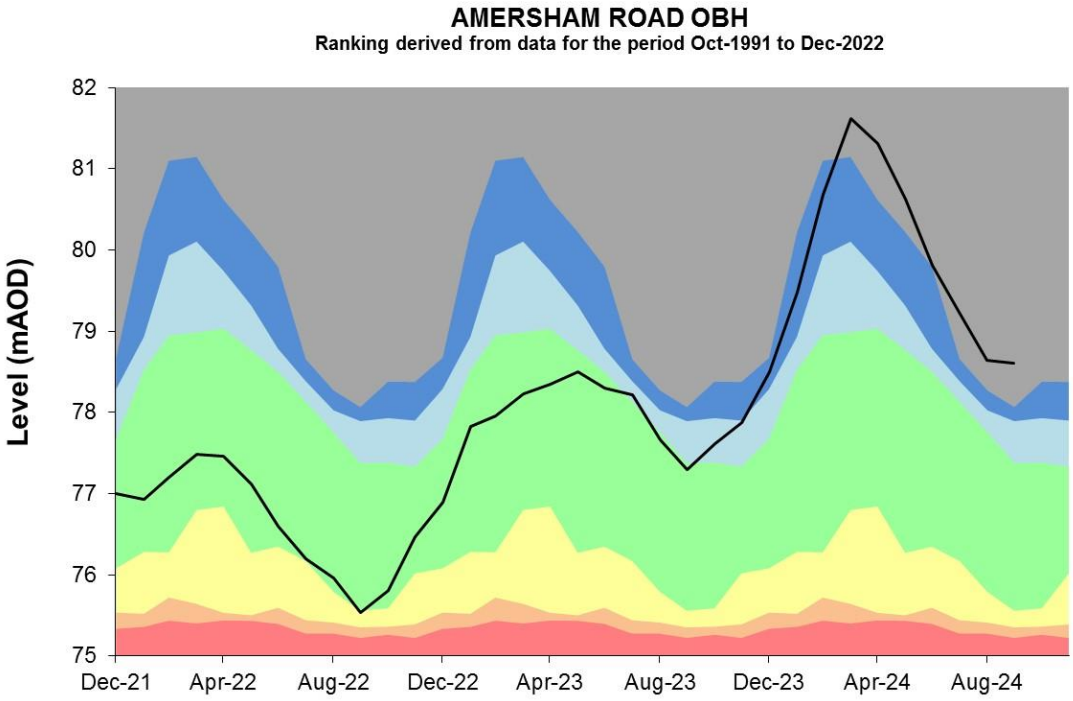


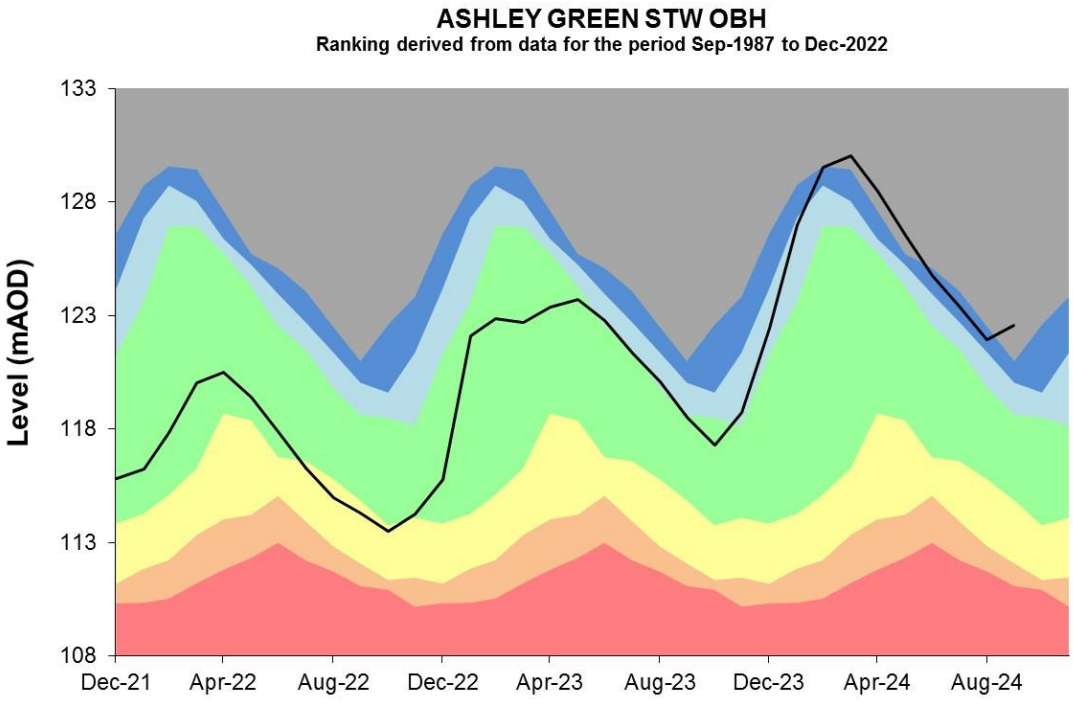


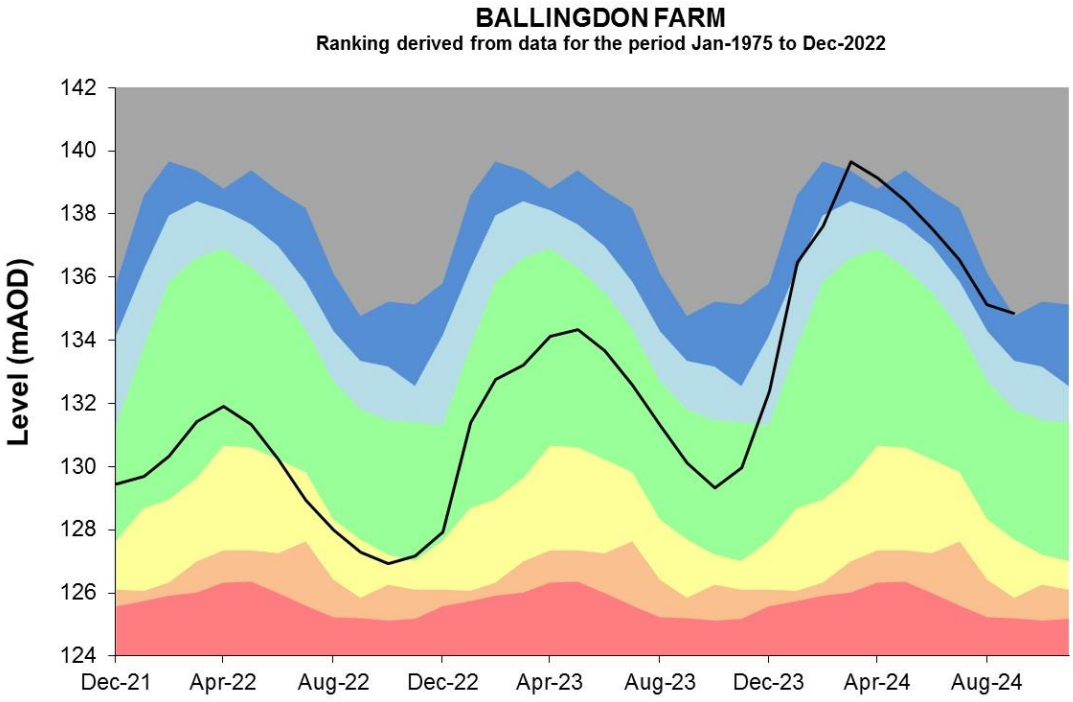
Source: Environment Agency, 2024

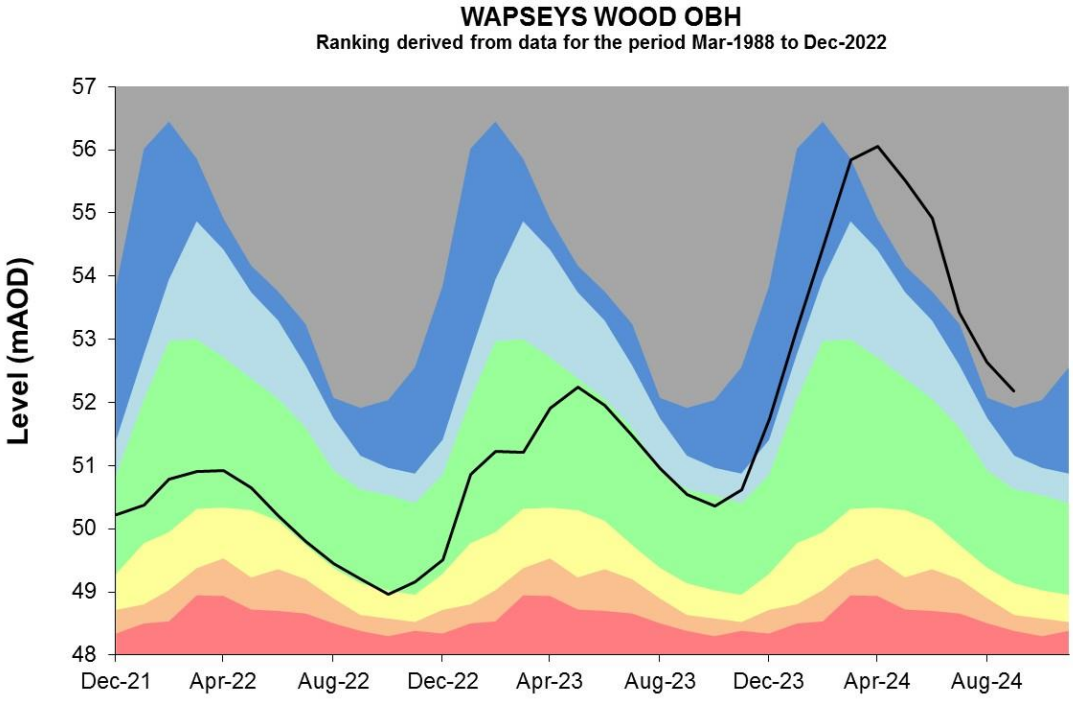
4.3 Colne Groundwater level charts

Figure 4.3: 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.







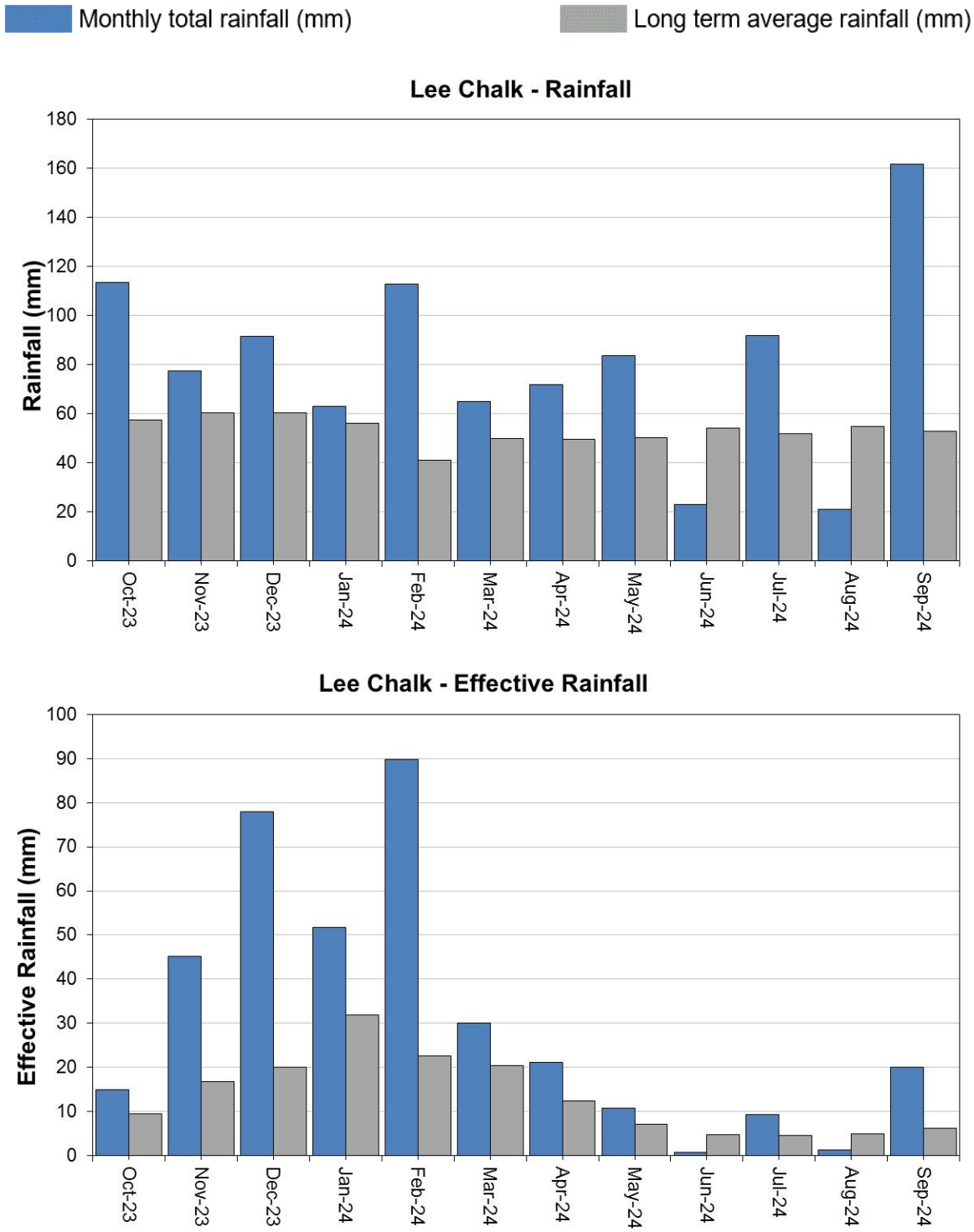


Source: Environment Agency, 2024

5 Upper Lee Catchment

5.1 Upper Lee Rainfall and Effective rainfall charts

Figure 5.1: Monthly rainfall and effective rainfall totals for the past 12 months compared to the 1961 to 1990 long term average for each region and for England.

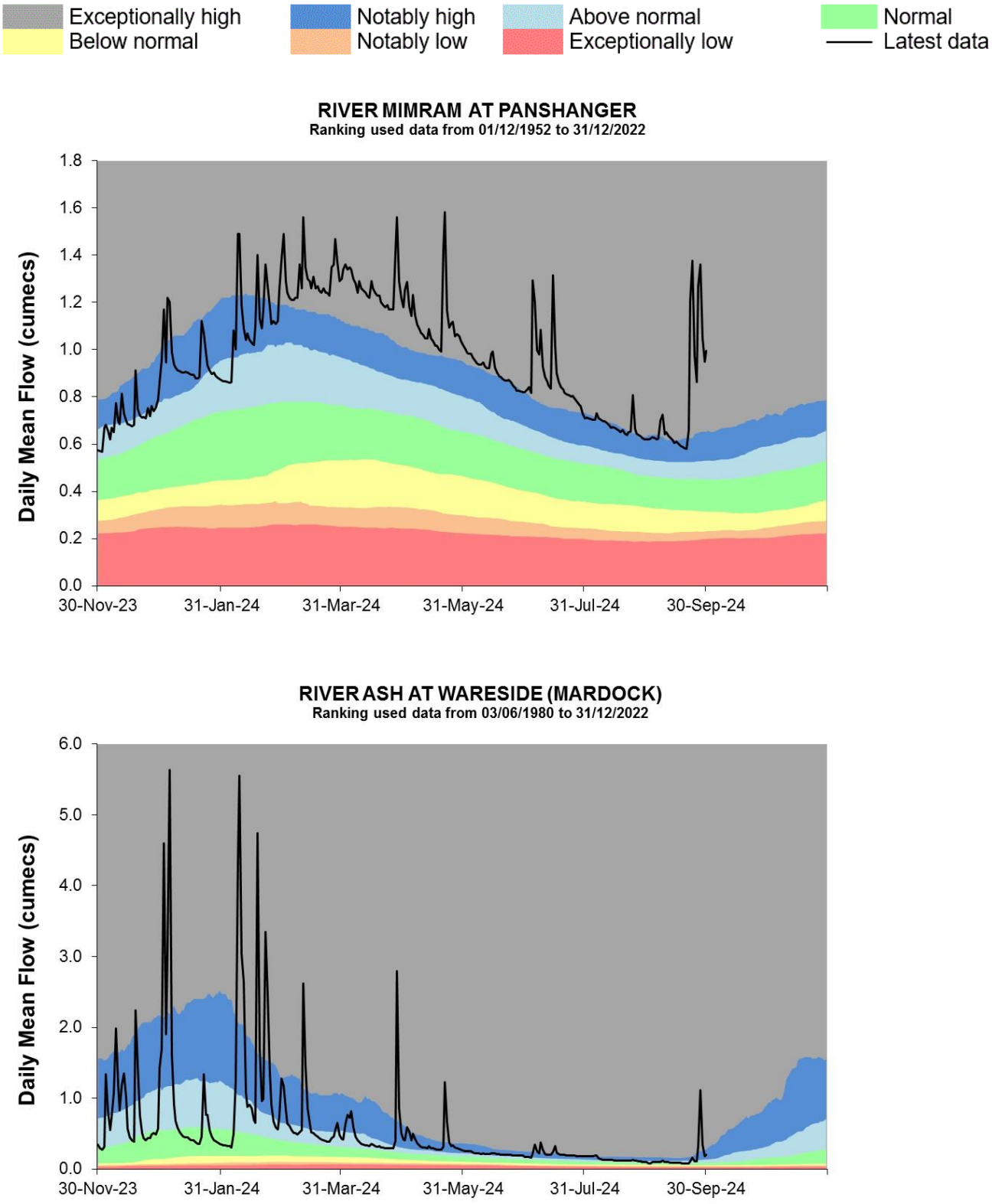


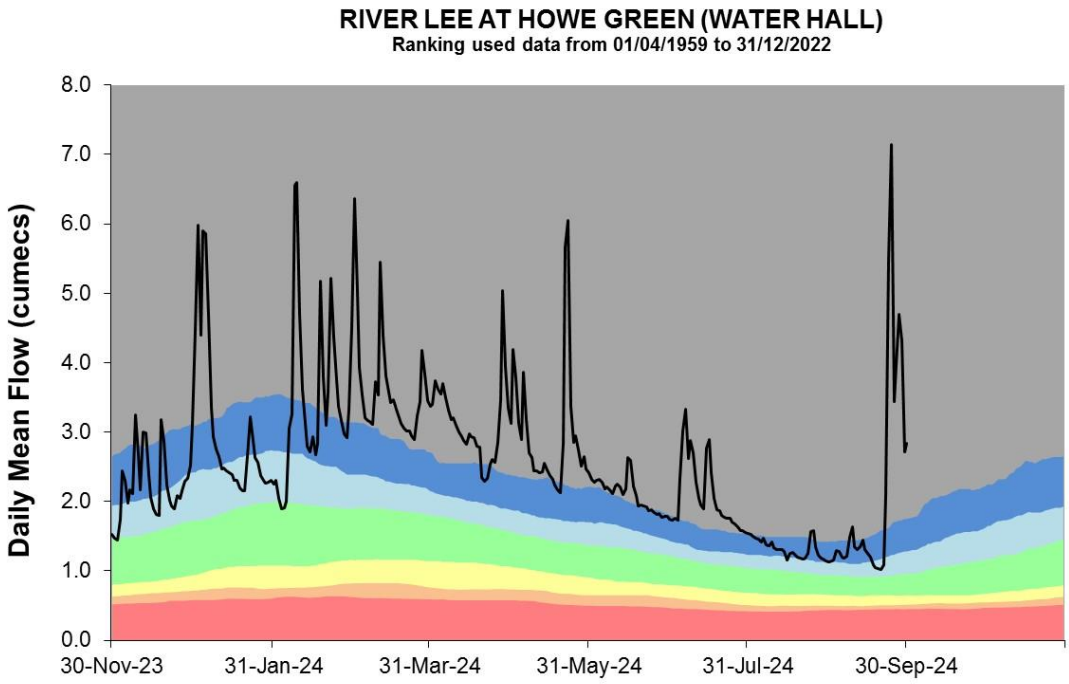
HadUK rainfall data (Source: Met Office. Crown copyright, 2024)

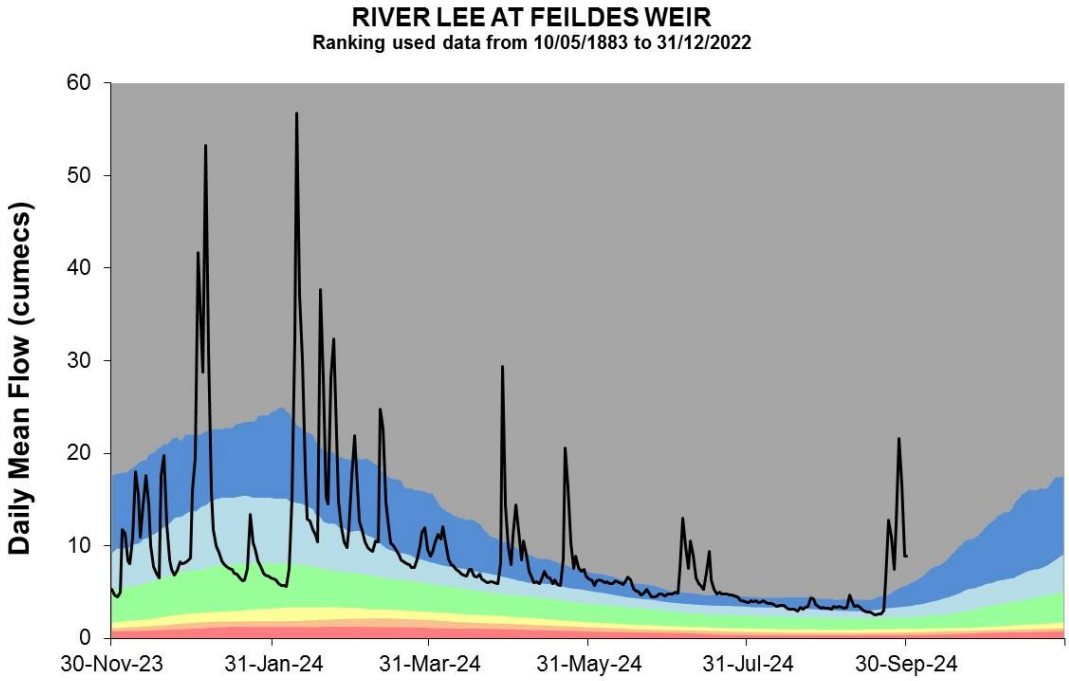
EA Soil Moisture Model effective rainfall data (Source: Environment Agency, 2024)

5.2 Upper Lee River flow charts

Figure 5.2 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.



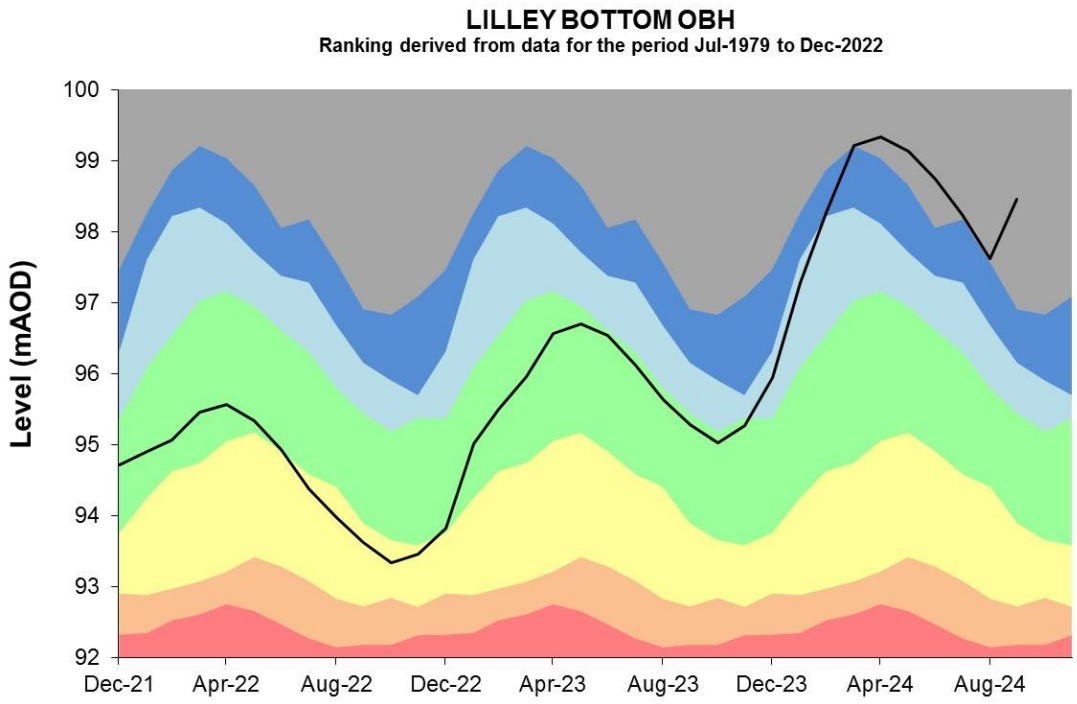


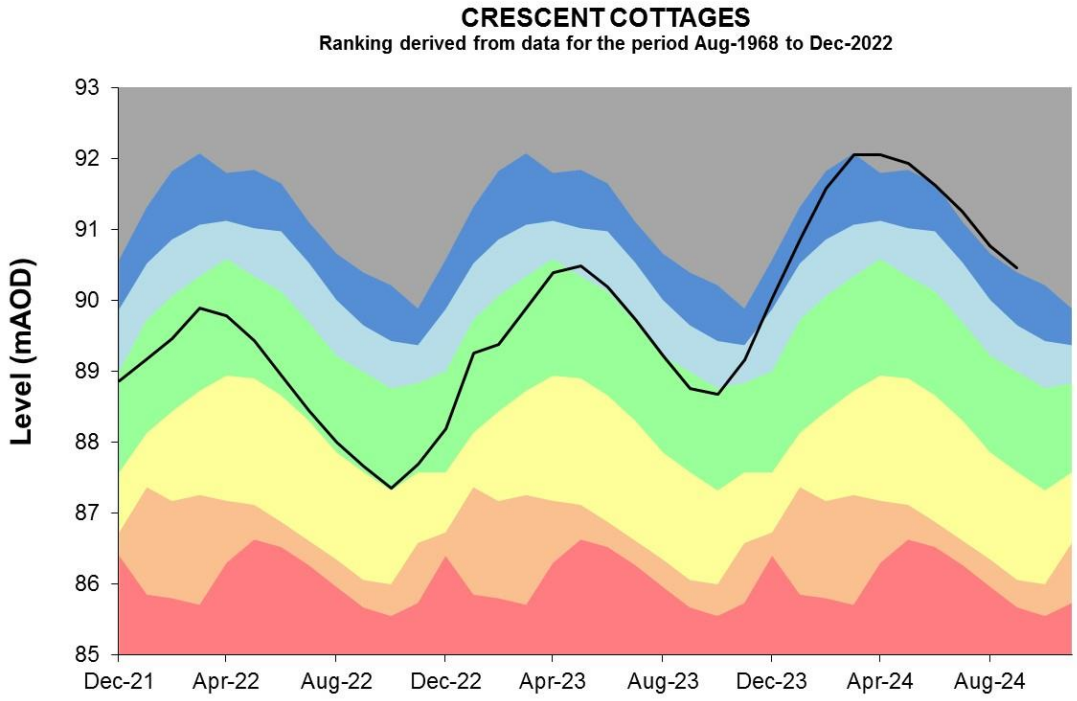


Source: Environment Agency, 2024

5.3 Upper Lee Groundwater level charts

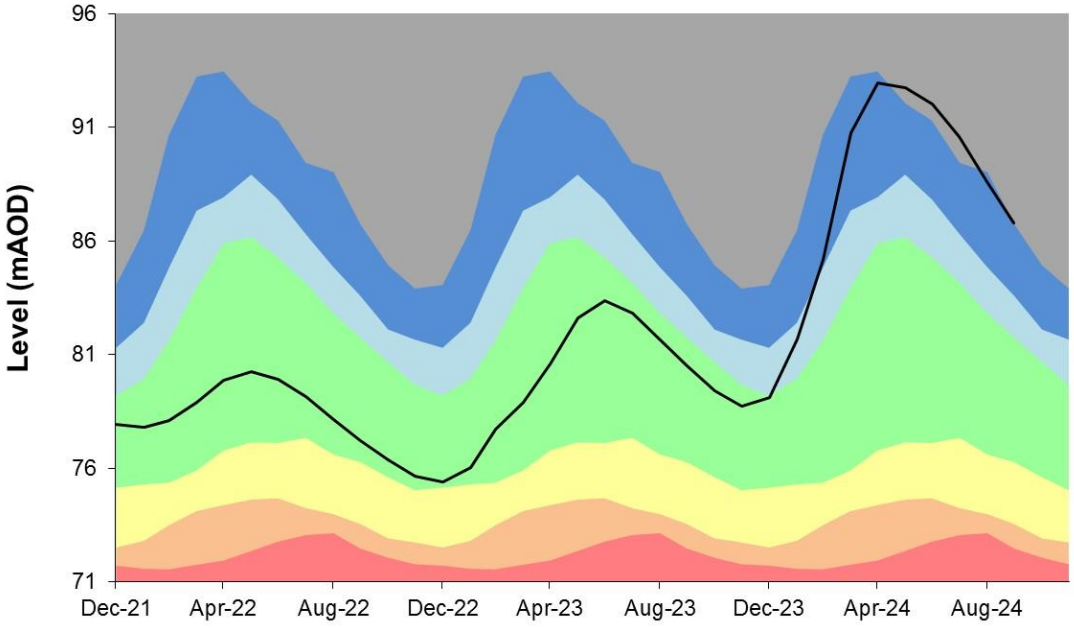
Figure 5.3: End of month groundwater levels at index groundwater level sites for major aquifers. 22 months compared to an analysis of historic end of month levels and long term maximum and minimum levels.





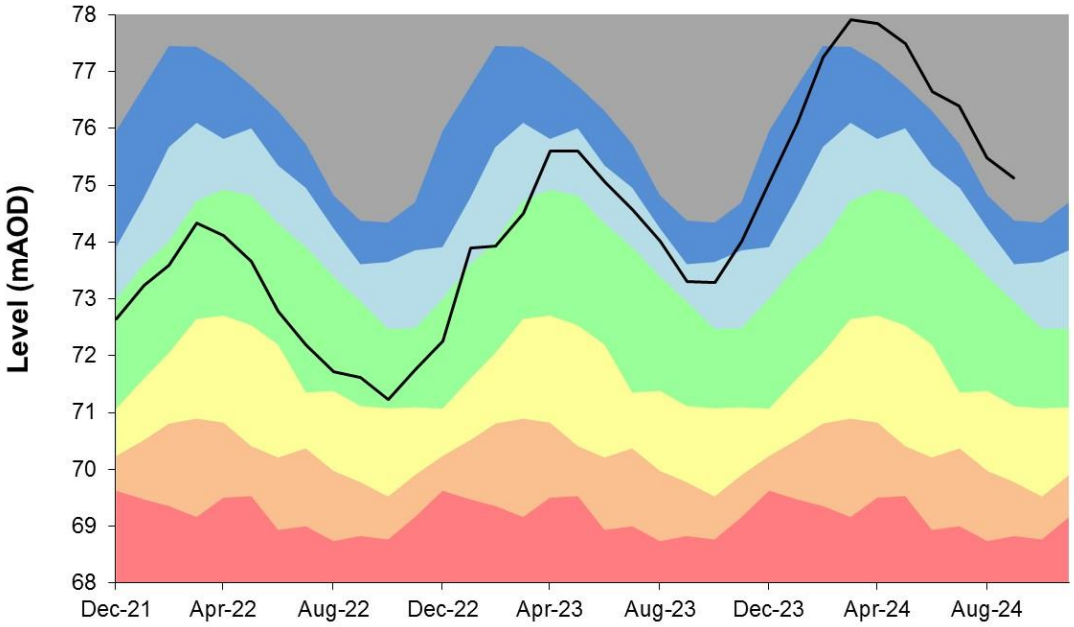
THERFIELD RECTORY

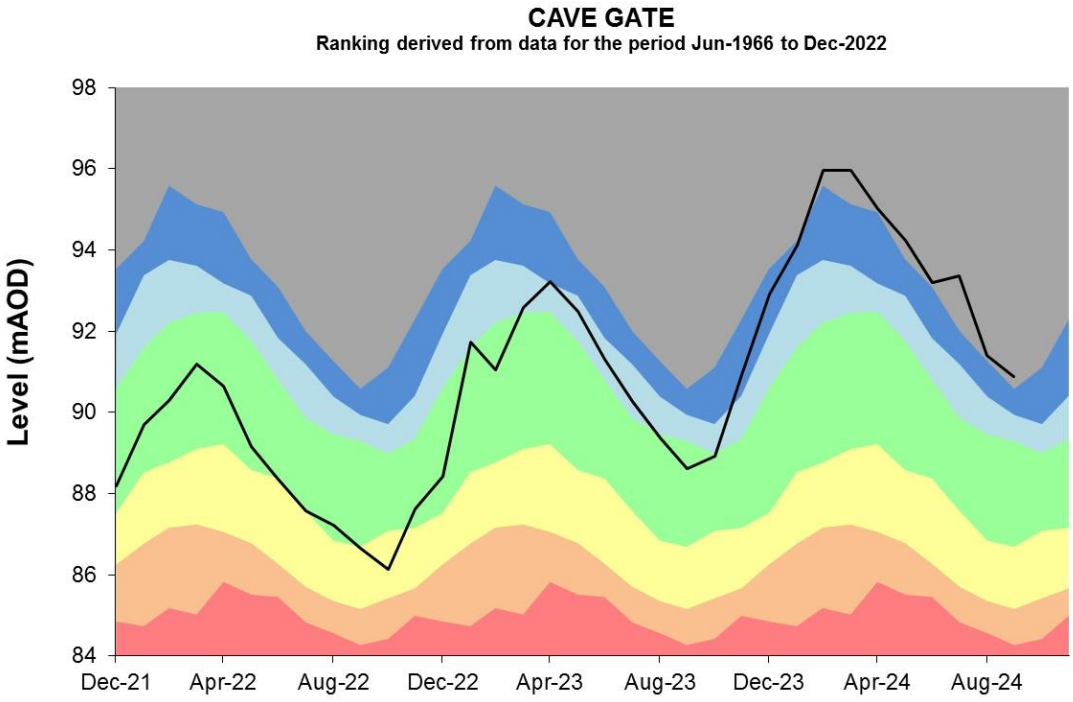
Ranking derived from data for the period Jan-1883 to Dec-2022



HIXHAM HALL

Ranking derived from data for the period Jun-1964 to Dec-2022



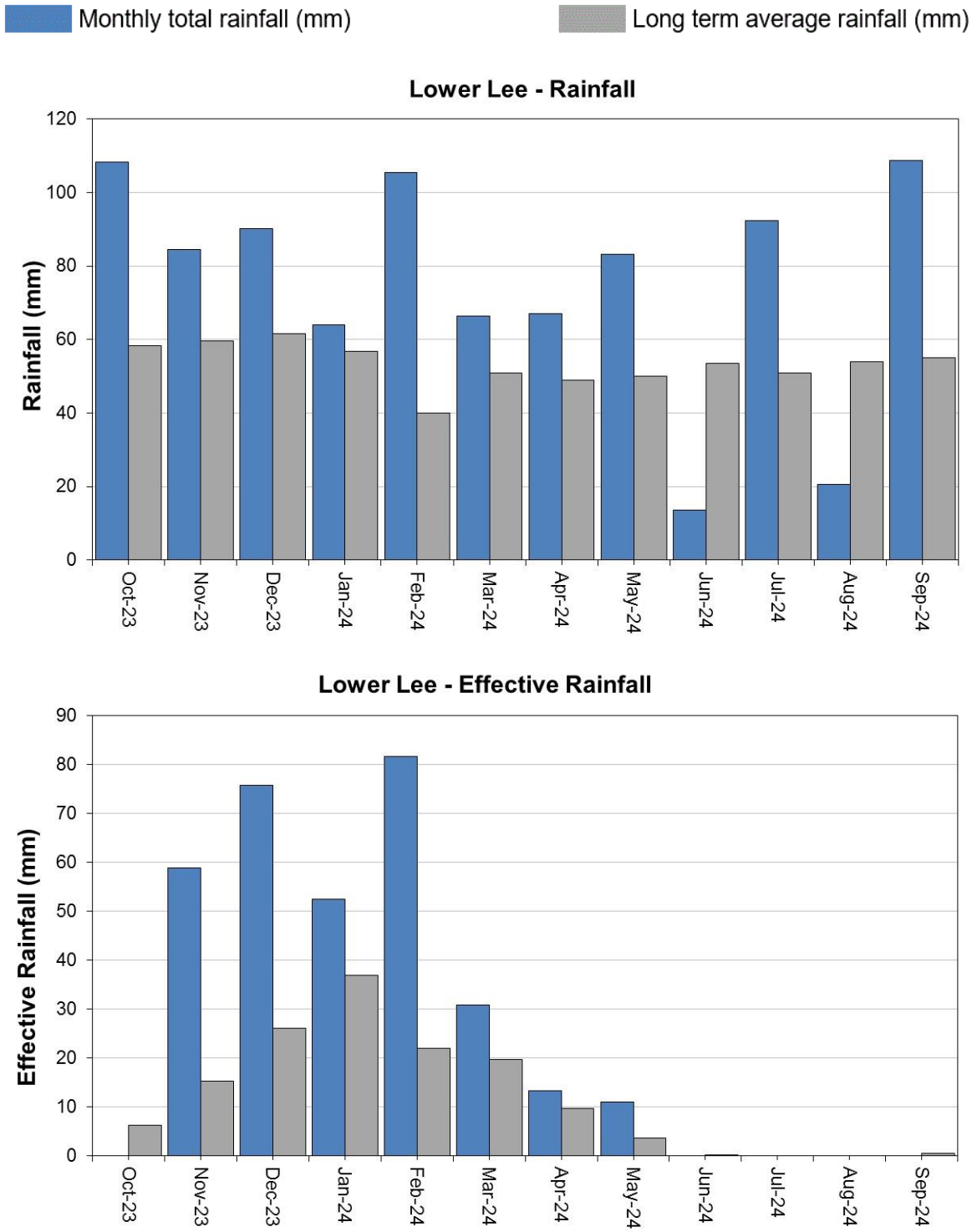


Source: Environment Agency, 2024

6 Lower Lee Catchment

6.1 Lower Lee Rainfall and Effective Rainfall charts

Figure 6.1: Monthly rainfall and effective rainfall totals for the past 12 months as a percentage of the 1961 to 1990 long term average for the Lower Lee.

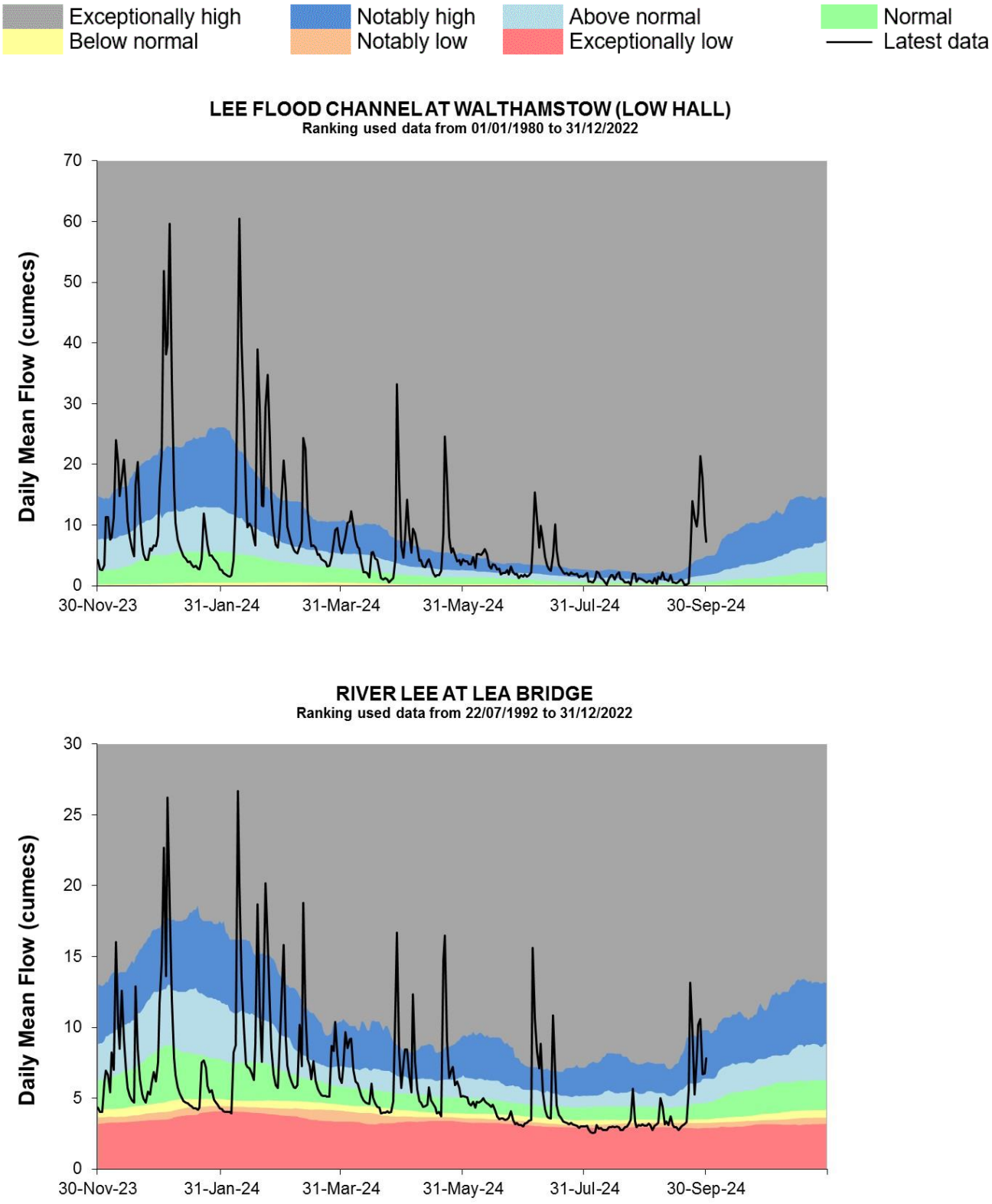


HadUK rainfall data (Source: Met Office. Crown copyright, 2024)

EA Soil Moisture Model effective rainfall data (Source: Environment Agency, 2024)

6.2 Lower Lee River flow charts

Figure 6.2: 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.

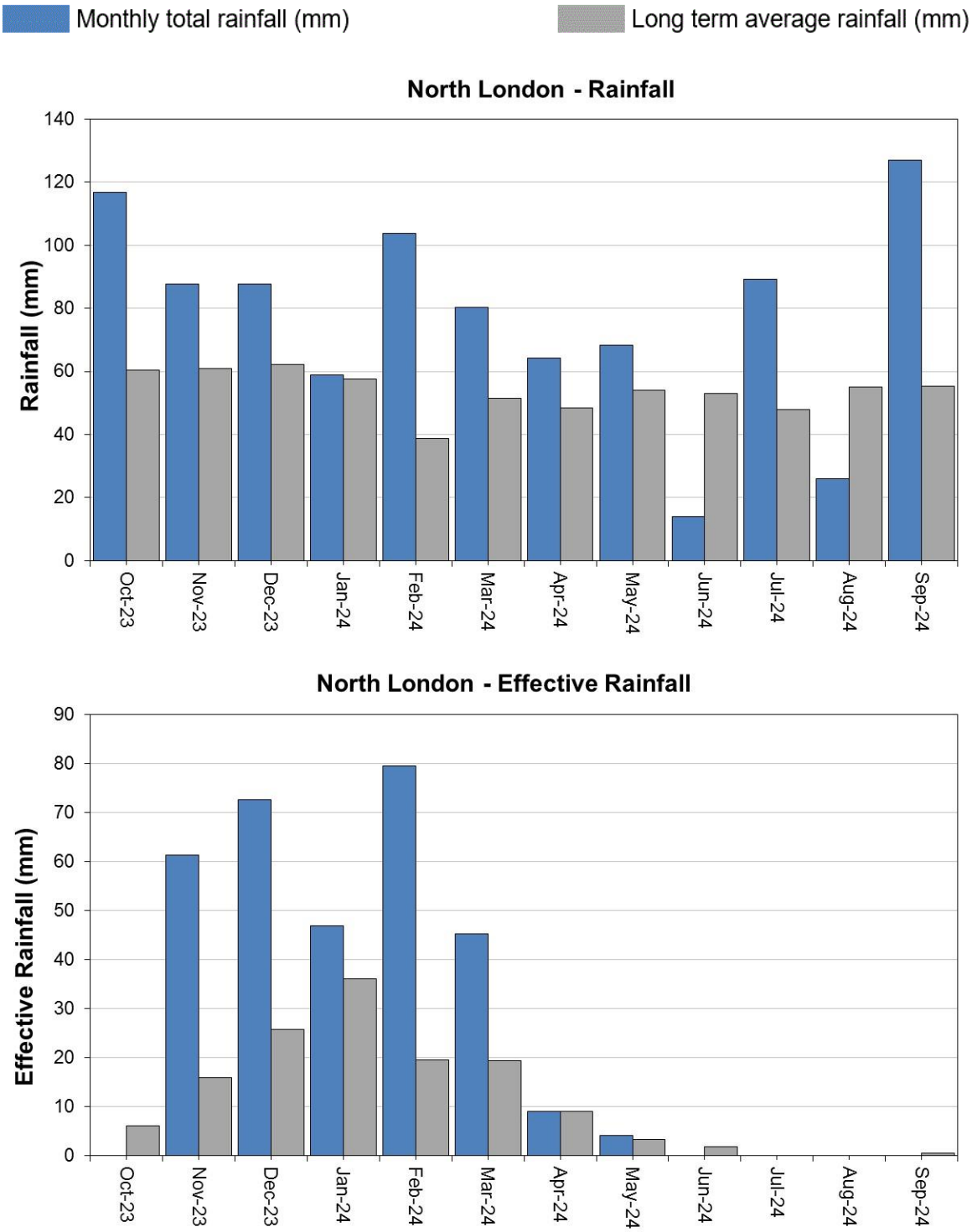


Source: Environment Agency, 2024

7 North London Catchment

7.1 North London Rainfall and Effective Rainfall charts

Figure 7.1: Monthly rainfall and effective rainfall totals for the past 12 months compared to the 1961 to 1990 long term average for each region and for England.

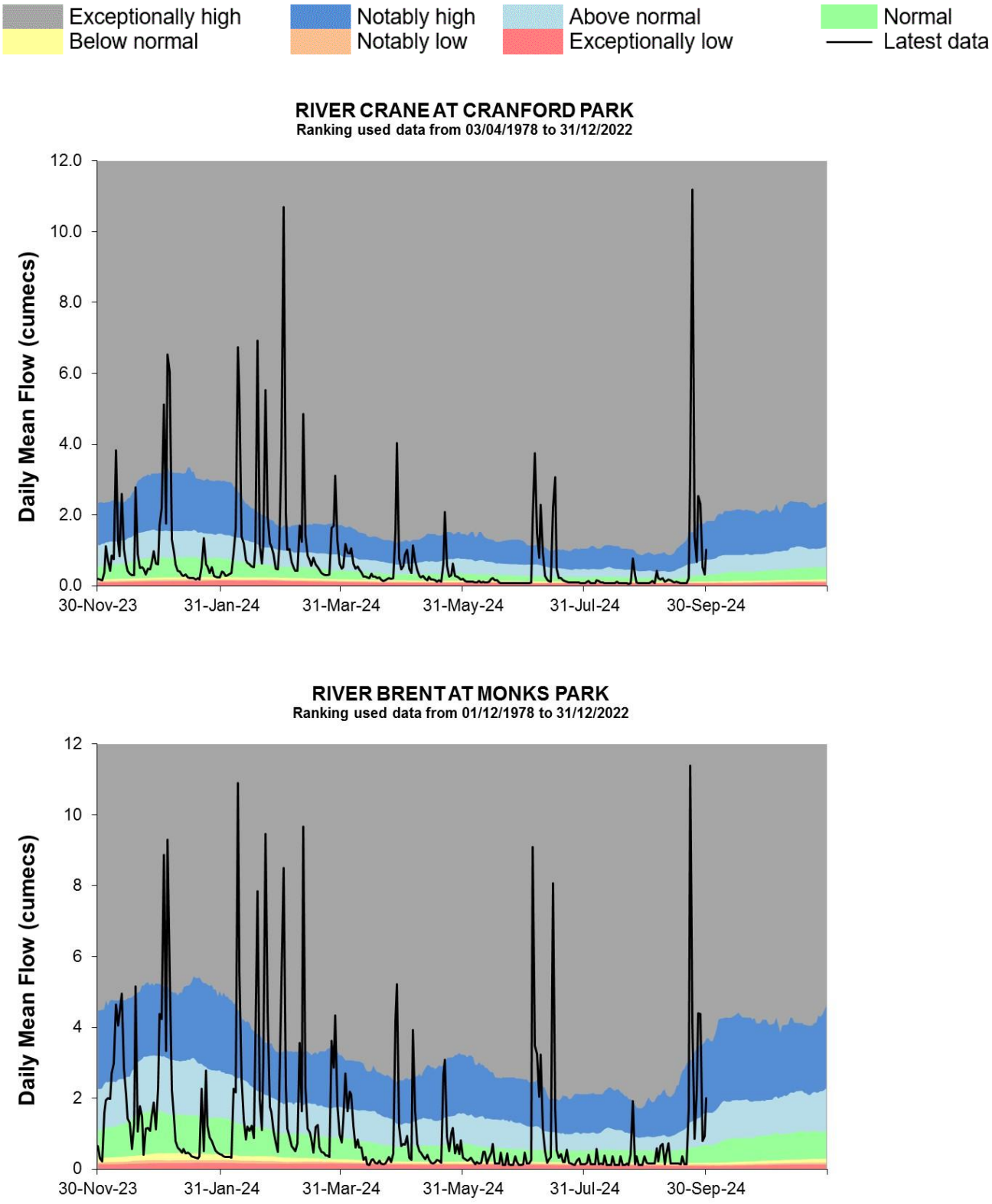


HadUK rainfall data (Source: Met Office. Crown copyright, 2024)

EA Soil Moisture Model effective rainfall data (Source: Environment Agency, 2024)

7.2 North London River flow charts

Figure 7.2: 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.

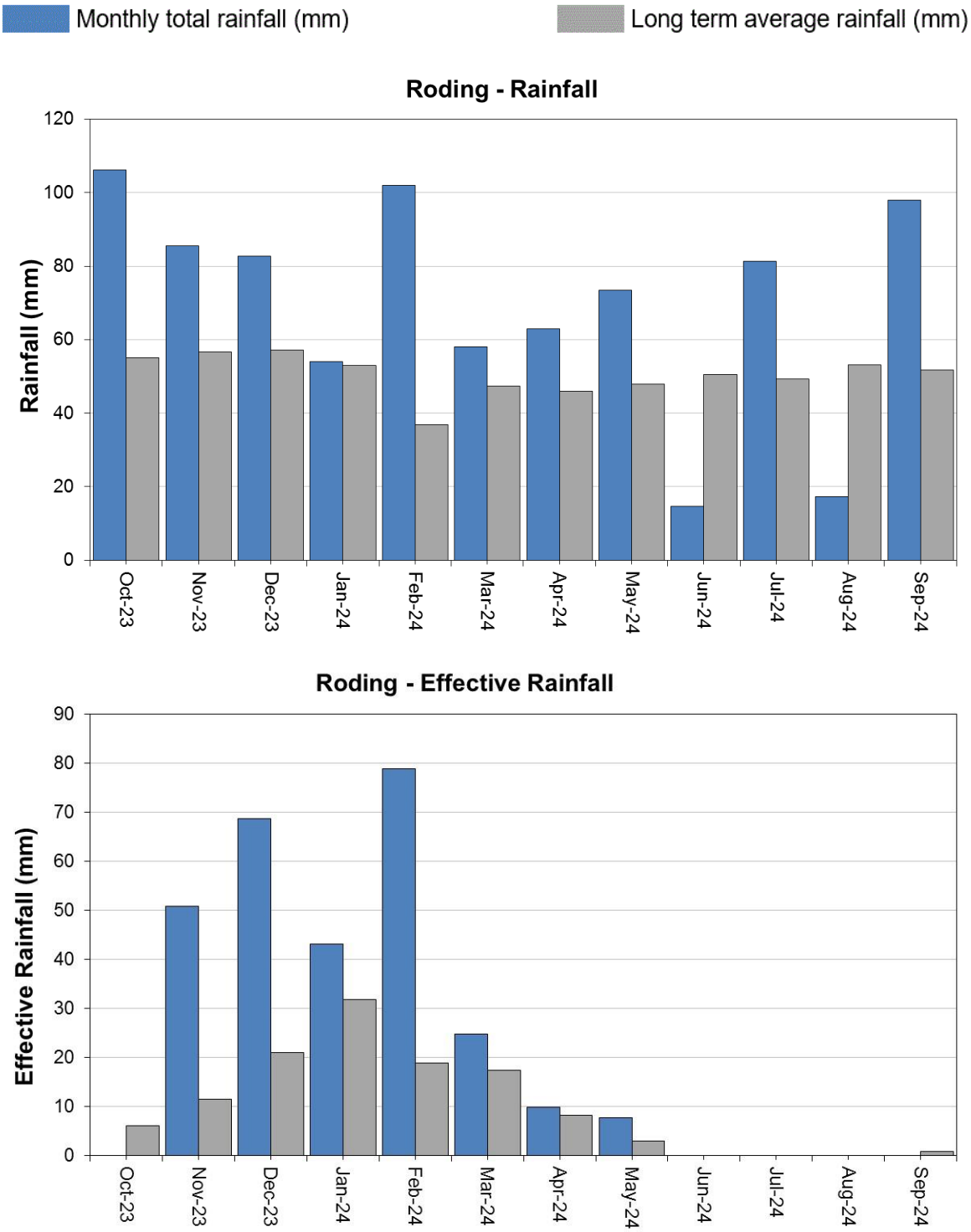


Source: Environment Agency, 2024

8 Roding Catchment

8.1 Roding Rainfall and Recharge chart

Figure 8.1: Monthly rainfall and recharge totals for the past 12 months compared to the 1961 to 1990 long term average for each region and for England.

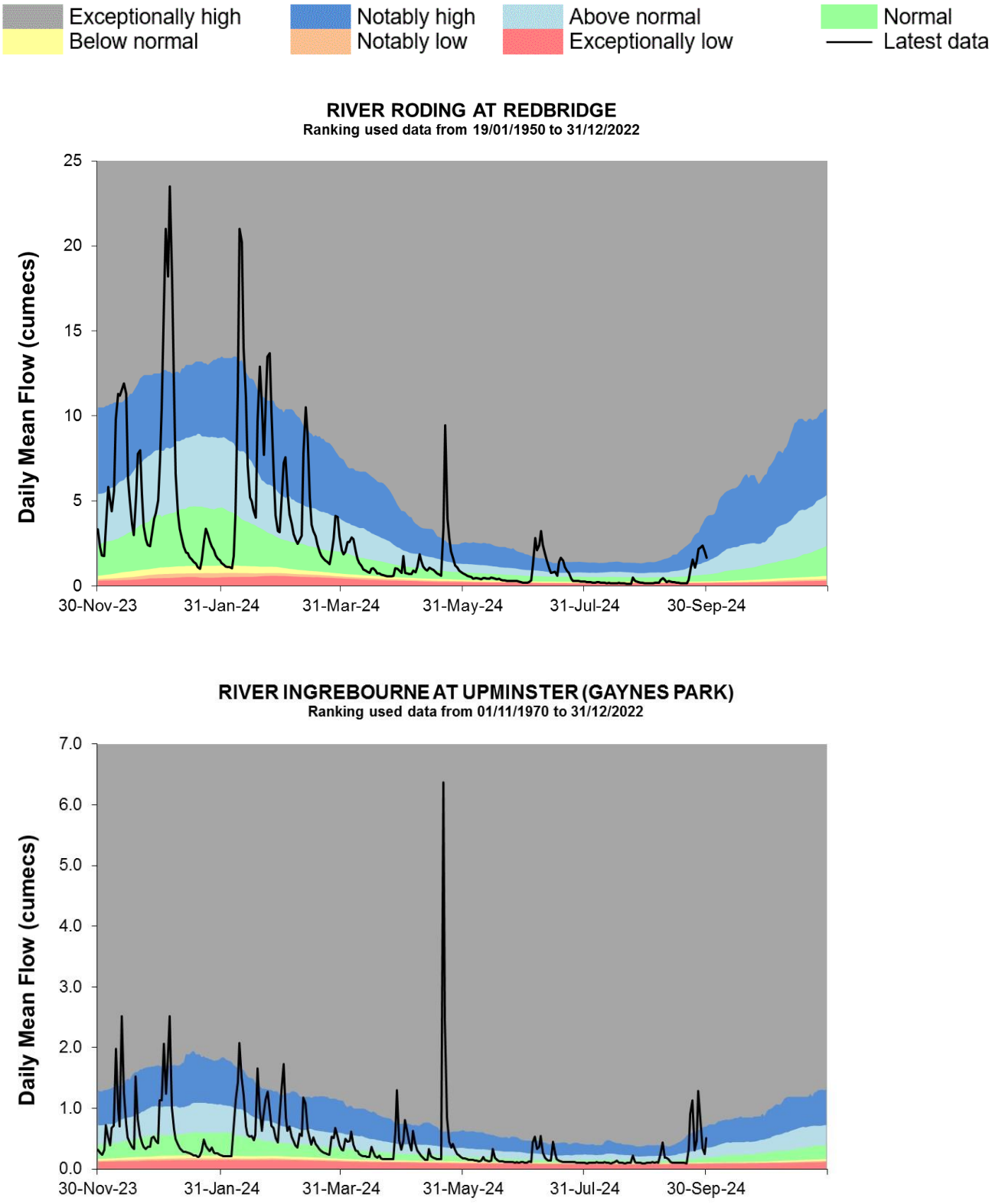


HadUK rainfall data (Source: Met Office. Crown copyright, 2024)

EA Soil Moisture Model effective rainfall data (Source: Environment Agency, 2024)

8.2 Roding River flow charts

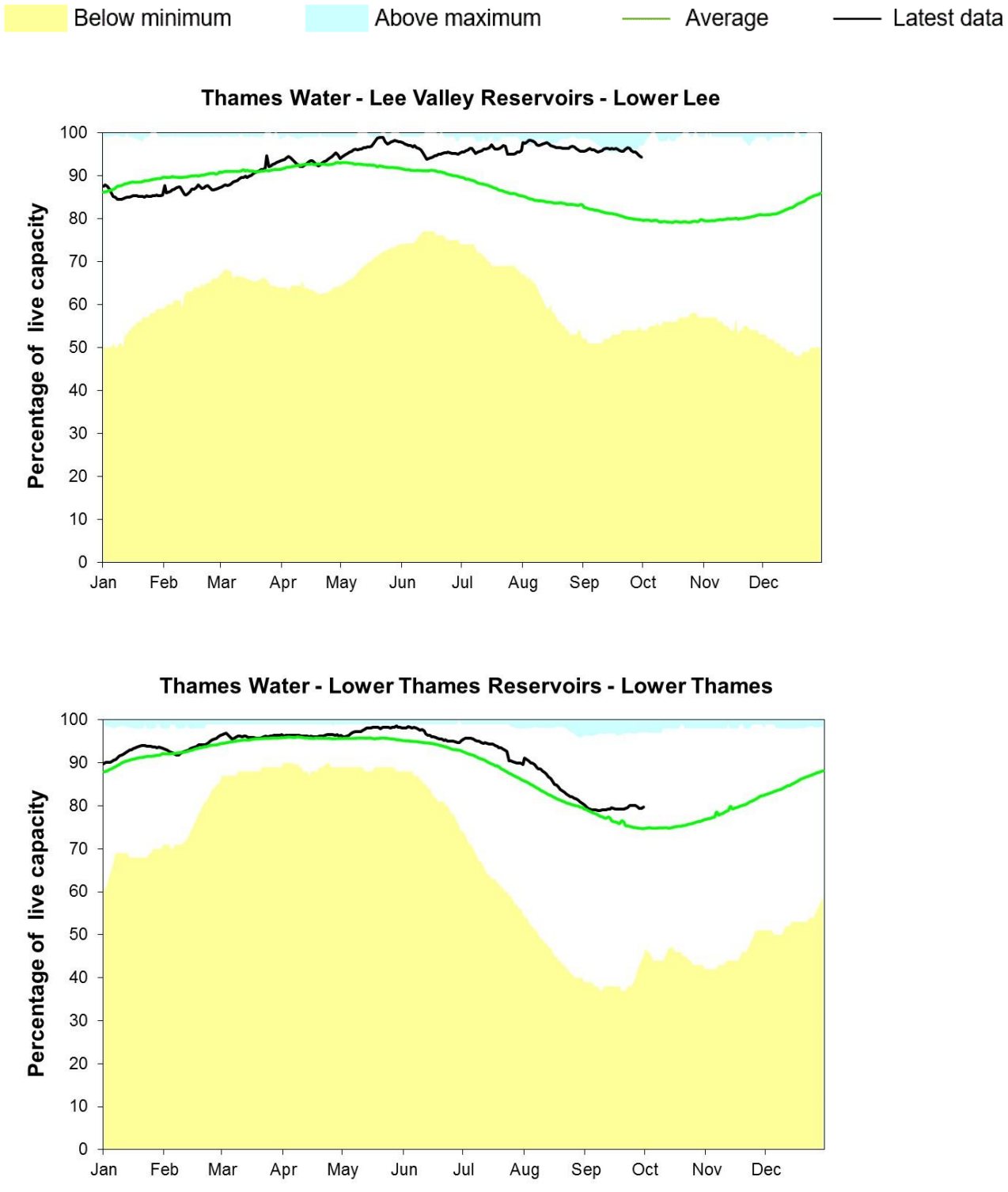
Figure 8.2: Daily mean river flow for index sites over the past year, compared to an analysis of historic daily mean flows, and long term maximum and minimum flows.



Source: Environment Agency, 2024

9 Reservoir stocks

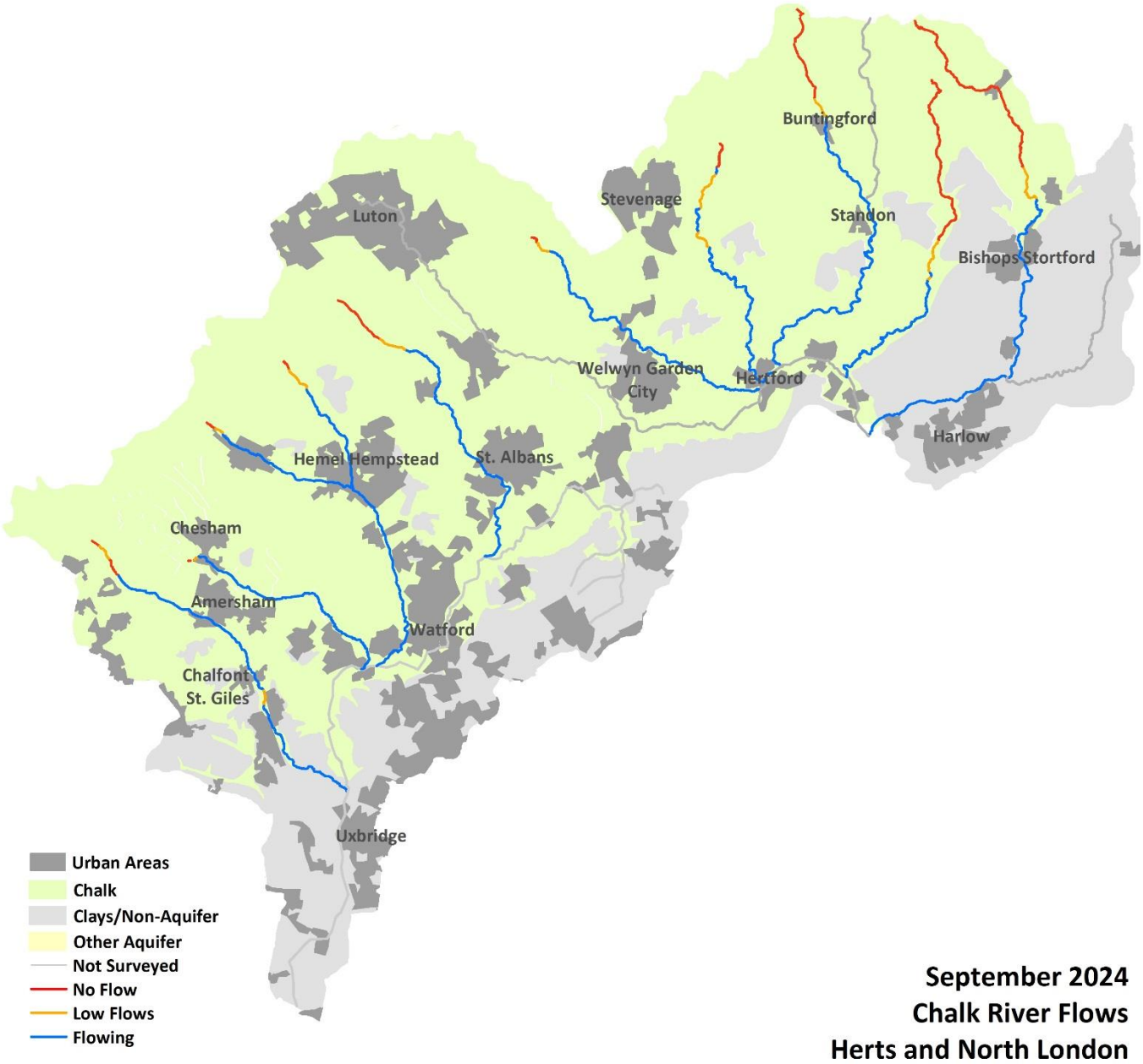
Figure 9.1: End of month reservoir stocks for the Lower Thames reservoir group and the Lee Valley reservoir group compared to long term maximum, minimum and average stocks. Note: Historic records of individual reservoirs and reservoir groups making up the regional values vary in length.



Source: water companies, 2024

10 Chalk Rivers

Figure 10.1: Length of Chalk Rivers surveyed during the month and categorised as: Flowing, Low Flows, No Flow or Not Surveyed.



Source: Environment Agency, 2024

11 Glossary

11.1 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).

11.2 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.

12 Appendices

12.1 Rainfall table

Hydrological area	Sep 2024 total rainfall in mm	Sep 2024 rainfall long term average 1961 to 1990	Sep 2024 rainfall % of long term average 1961 to 1990	Summer Apr 2024 to Sep 2024 total rainfall in mm	Summer Apr 2024 to Sep 2024 rainfall % of long term average 1961 to 1990
Chilterns East Colne	173	60	289	480	142
Lee Chalk	162	53	306	452	145
Lower Lee	109	55	198	385	124
North London	127	55	229	388	124
Roding	98	52	189	347	117
Herts and North London total	134	55	242	410	130

12.2 Rainfall banding table

Hydrological area	Sep 2024 band	Jul 2024 to Sep 2024 cumulative band	Apr 2024 to Sep 2024 cumulative band	Oct 2023 to Sep 2024 cumulative band
Chilterns East Colne	Exceptionally high	Exceptionally high	Exceptionally high	Exceptionally high
Lee Chalk	Exceptionally high	Exceptionally high	Exceptionally high	Exceptionally high
Lower Lee	Notably high	Above normal	Above normal	Exceptionally high
North London	Exceptionally high	Notably high	Notably high	Exceptionally high
Roding	Notably high	Above normal	Above normal	Exceptionally high

12.3 Effective Rainfall table

Hydrological area	Sep 2024 total effective rainfall in mm	Sep 2024 effective rainfall long term average 1961 to 1990 in mm	Sep 2024 effective rainfall % of long term average 1961 to 1990	Summer Apr 2024 to Sep 2024 total effective rainfall in mm	Summer Apr 2024 to Sep 2024 effective rainfall % of long term average 1961 to 1990
Chilterns East Colne	33	7	471	86	176
Lee Chalk	20	6	330	63	158
Lower Lee	0	0	0	24	176
North London	0	0	0	13	89
Roding	0	1	0	17	147
Herts and North London total	11	3	356	41	158

12.4 Soil Moisture Deficit table

Hydrological area	Sep 2024 end of month Soil Moisture Deficit in mm	Sep 2024 end of month Soil Moisture Deficit long term average 1961 to 1990 in mm	Aug 2024 end of month Soil Moisture Deficit in mm	Aug 2024 end of month Soil Moisture Deficit long term average 1961 to 1990 in mm
Chilterns East Colne	0	94	94	92
Lee Chalk	3	104	98	100
Lower Lee	36	97	106	95
North London	27	100	106	99
Roding	48	99	104	96
Herts and North London total	23	99	101	96

12.5 River flows table

Site name	River	Catchment	Sep 2024 band	Aug 2024 band
Colney Street (Hansteads)	Ver	Colne	Exceptionally high	Exceptionally high
Croxley Green	Gade	Colne	Exceptionally high	Exceptionally high
Denham Lodge	Misbourne	Colne	Exceptionally high	Exceptionally high
Denham Colne	Colne	Colne	Exceptionally high	Normal
Howe Green (Water Hall)	Lee	Upper Lee	Exceptionally high	Exceptionally high
Panshanger	Mimram	Upper Lee	Exceptionally high	Exceptionally high
Wareside (Mardock)	Ash	Upper Lee	Notably high	Notably high
Feildes Weir (naturalised)	Lee	Upper Lee	Exceptionally high	Notably high
Brent (Monks Park)	Brent	North London	Notably high	Exceptionally low
Cranford (Cranford Park)	Crane	North London	Exceptionally high	Exceptionally low
Redbridge	Roding	Roding, Beam and Ingrebourne	Above normal	Exceptionally low
Upminster (Gaynes Park)	Ingrebourne	Roding, Beam and Ingrebourne	Exceptionally high	Notably low

12.6 Groundwater table

Site name	Aquifer	Sep 2024 band	Aug 2024 band
Ashley Green	Mid-Chilterns Chalk	Exceptionally high	Notably high
Ballingdon Farm	Mid-Chilterns Chalk	Exceptionally high	Notably high
Amersham Road	Mid-Chilterns Chalk	Exceptionally high	Exceptionally high
Wapseys Wood	Mid-Chilterns Chalk	Exceptionally high	Exceptionally high
Lilley Bottom	Upper Lee Chalk	Exceptionally high	Exceptionally high
Crescent Cottages	Upper Lee Chalk	Exceptionally high	Exceptionally high
Cave Gate	Upper Lee Chalk	Exceptionally high	Exceptionally high
Hixham Hall	Upper Lee Chalk	Exceptionally high	Exceptionally high
Therfield Rectory	Upper Lee Chalk	Exceptionally high	Notably high

12.7 Abstraction licence flow constraints

Number of flow constraints in force between 2 and 9 September 2024	Number of flow constraints in force between 9 and 16 September 2024	Number of flow constraints in force between 16 and 23 April 2024	Number of flow constraints in force between 23 and 30 April 2024
2	9	1	1