Monthly water situation report: Hertfordshire and North London Area

1 Summary - March 2024

It was the second wettest winter on record for the Hertfordshire and North London area, receiving 72mm of rainfall during March, 138% of the long term average. The soil moisture deficits remained well below the long term average. Many rivers recorded their second largest March monthly mean river flows with many in the exceptionally high band. Groundwater levels recorded across the Mid Chilterns Chalk had only been higher in March 2001 with seven out of ten monthly indicator sites in the exceptionally high band.

1.1 Rainfall

With heavy downpours during March, the succession of winter months with higher than average rainfall continued. The Hertfordshire and North London area ("the Area") received 138% of the long term average (LTA) rainfall (72mm) during March. Rainfall totals were slightly lower than February, but all five areal units across the Area ended the month in the above normal and notably high bands. The first day of March was the wettest of the month, with over 17mm widely recorded across the Chilterns and North London (Rain Gauge totals - Pinner (North London): 18mm, Heathrow (North London): 17.8mm, Northolt (Chilterns): 17.6mm, and Radlett (Chilterns): 17.3mm). The rest of March saw frequent showers, with notable totals recorded between 10-12 March, 14-17 March, and 26-28 March. Despite the downpours, there were warm and dry interludes with an average of 12 dry days (less than 0.2mm of rain). It was the second wettest winter (October to March) on record for the Area (540mm, 161% LTA winter rainfall)) with only the winter of 2001 seeing more rainfall (642mm) (period of record 1872-Present).

1.2 Soil moisture deficit and recharge

The warm and dry interludes during March, along with an early start to spring for many plants, allowed a small increase in the Area's soil moisture deficits (SMD) from 0mm at the start of the month to 2mm at the end of the month. However, the wet weather ensured the SMDs remained well below the month end average (LTA 10mm). The saturated soils meant that the heavy rainfall continued to contribute to runoff into the Area's rivers and recharge the groundwater levels. The Area received 175% of the LTA effective rainfall for March. For the winter period (October to March), the Area recorded 241% of the LTA effective rainfall.

1.3 River flows

River flows remained high throughout March with all of our river flow indicator sites recording monthly mean flows in either the notably high and exceptionally high bands (with the exception of flows in above normal band on the River Roding at Redbridge). By the end of the month, the second highest March monthly mean flows had been recorded at many locations across the Area (only March 2001 were higher) including at Croxley Green (River Gade), Denham Colne

(River Colne), Denham Lodge (River Misbourne), Cranford Park (River Crane), Howe Green (River Lee), and Colney Street (River Ver). (Period of record 1970, 1952, 1984, 1978, 1959, and 1956 respectively to present). Notable peak flows were seen across all rivers on 2 March, 12 March, and 28 March in response to the heavy rainfall. This resulted in a March total of 23 flood alerts and 2 flood warnings, with the flood warnings both being issued on the 2 March for the River Pinn at Yiewsley and the Colne Brook at Iver.

1.4 Groundwater levels

Groundwater levels continued to rise across the Area in March at all of our groundwater level indicator sites. Three indicator sites had end of March groundwater levels in the notably high band, while the other seven recorded levels in the exceptionally high band. With only March 2001 experiencing higher levels, Amersham Road and Ashley Green (both Mid Chliterns Chalk) recorded the locations second highest March groundwater levels on record (period of record 1991 and 1987 respectively to present). In the Upper Lee Chalk, Cave Gate, Hixham Hall, and Lilley Bottom recorded their third highest March groundwater levels on record after 2014 and 2001 (period of record 1966 and 1979 respectively to present).

1.5 Reservoir stocks

Lee Valley Reservoir stocks were below the LTA at the start of the month but increased from 87% to 93%, ending the month above the LTA. The Lower Thames reservoir levels remained the same throughout March starting and ending at 97%, above the LTA.

1.6 Environmental impact

The sources of Chalk rivers in the Colne catchment remained in similar locations to February with the exception of the River Ver which migrated upstream to Markyate Cell. The River Gade continued to flow from Hudnall Corner, while the source of the River Bulbourne remained upstream of Dudswell village near Cowroast. With the River Chess flowing well above Chesham, the River Misbourne continued to flow from its source at Mobwell Pond. There was little change from February in the Chalk river sources in the Upper Lee catchment. The River Mimram continued to flow upstream of Whitwell, above the lakes by Lilley Bottom Road, while the source of the River Beane remained the same, flowing upstream of Cromer. The River Rib flowed upstream of Hay Green and the River Stort flowed from its source above the village of Langley Lower Green. The River Ash (Herts) started to flow at Meesden, although it temporarily lost flow near Furneaux Pelham, with flows returning by Little Hadham.

To protect the environment during March a number of abstraction licence flow constraints were in force. This ranged between 2 and 9 per week, out of a maximum of 57.

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liability for any loss or damage arising from the interpretation or use of the information, or reliance upon views contained within.

2 Rainfall

2.1 Rainfall map

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

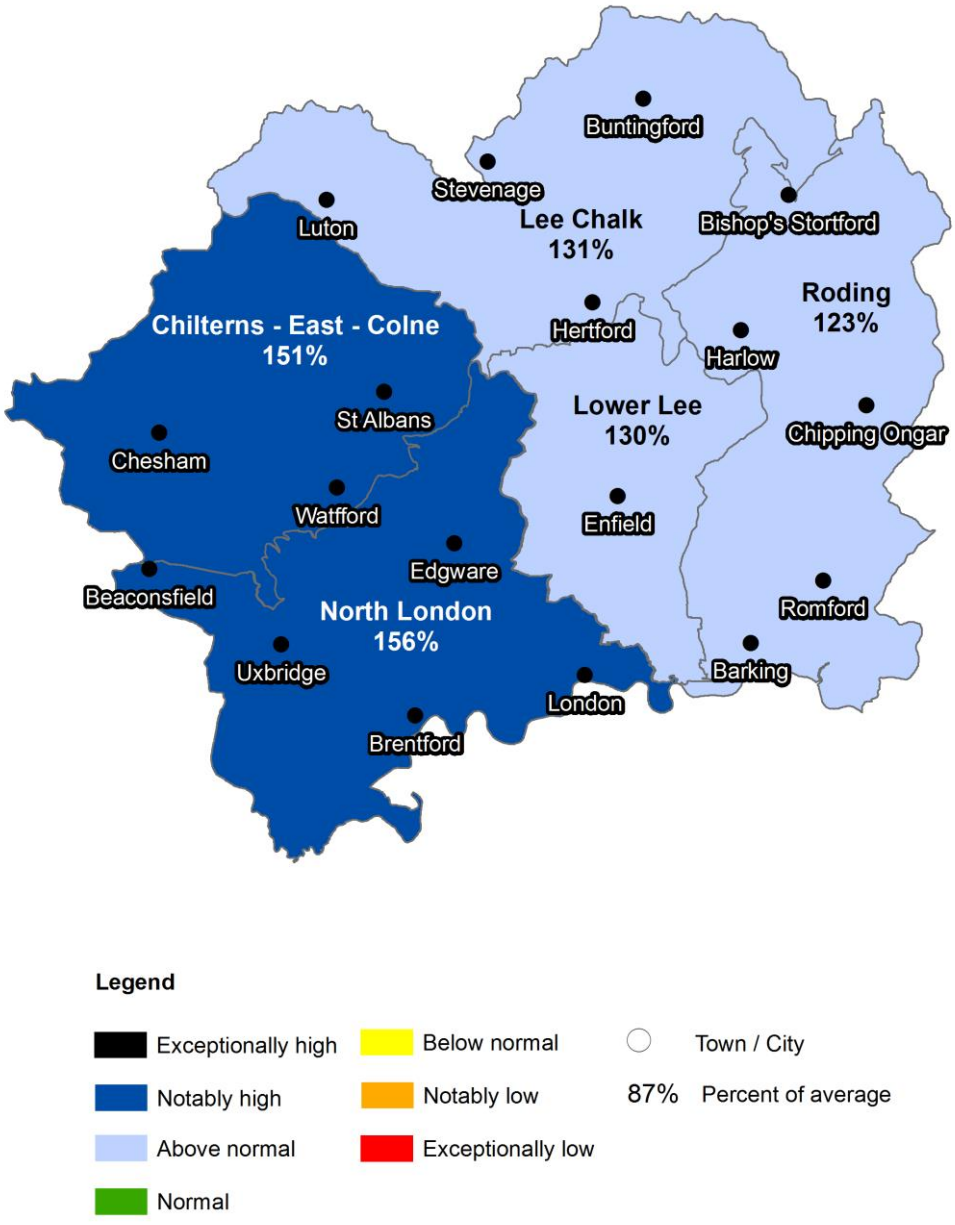
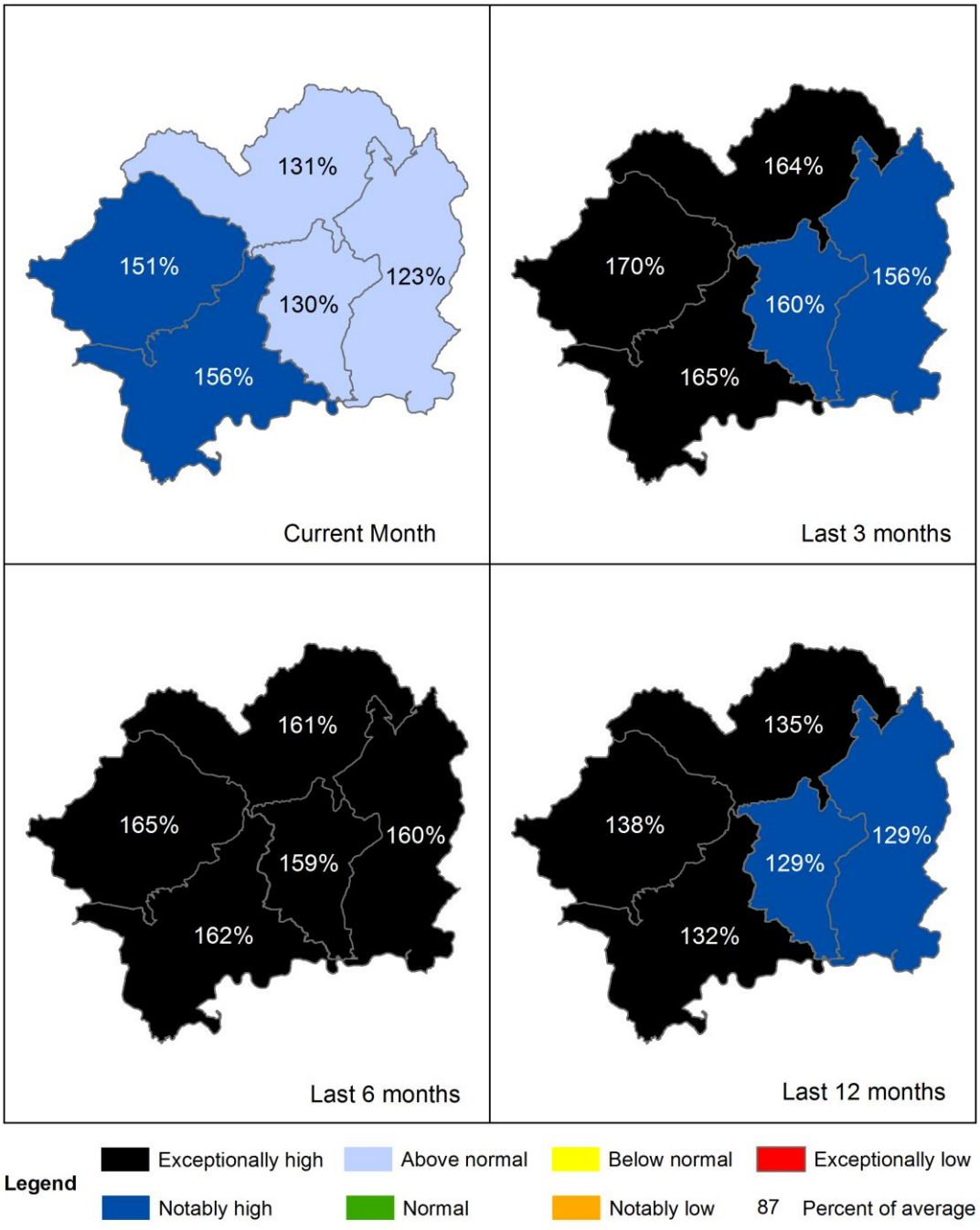


Figure 2.2: Total rainfall for hydrological areas for the current month (up to 31 March 2024), the last 3 months, the last 6 months, and the last 12 months, classed relative to an analysis of respective historic totals. Table available in the appendices with detailed information.

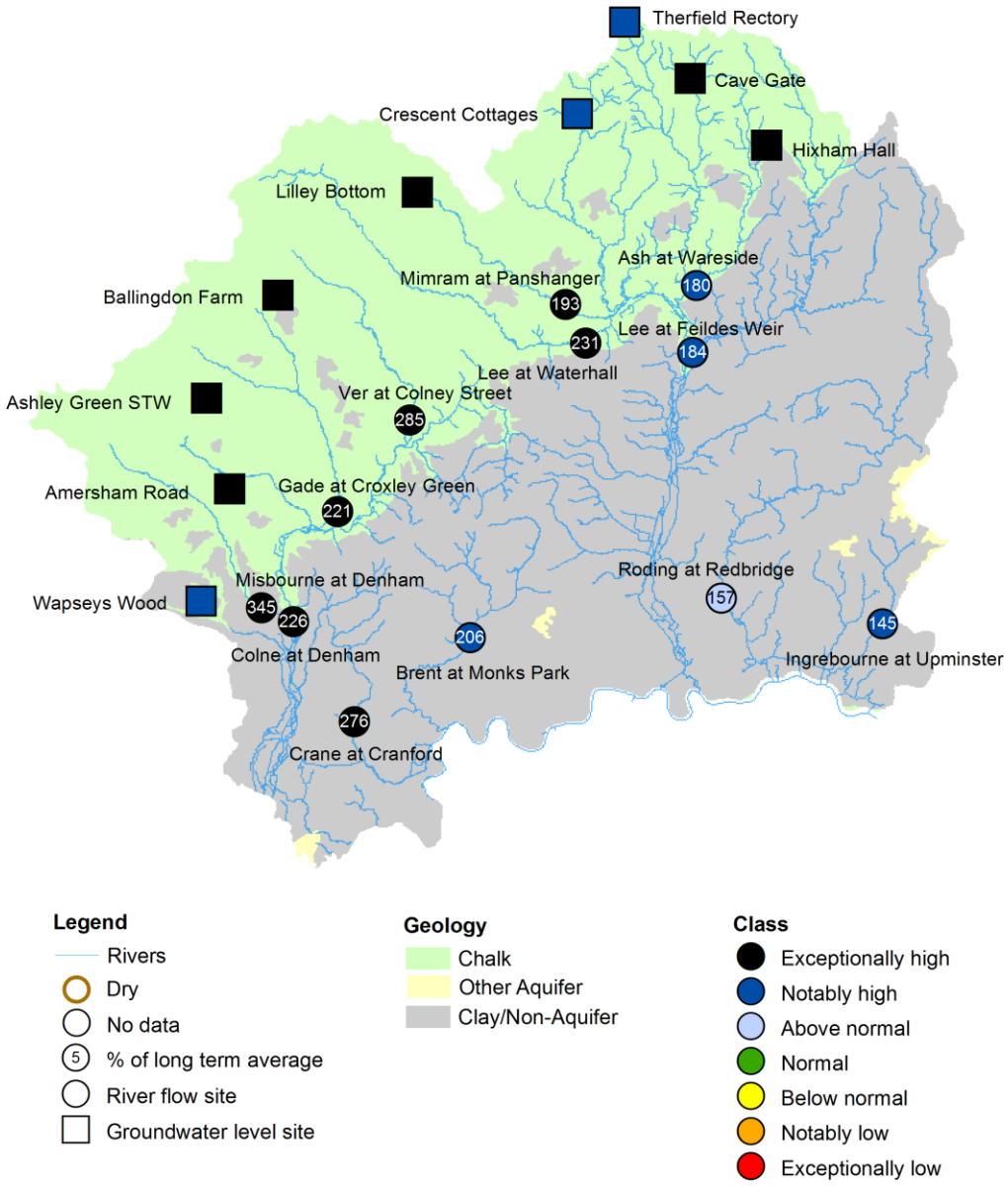


HadUK data based on the Met Office 1km gridded rainfall dataset derived from rain gauges (Source: Met Office. Crown copyright, 2024). Provisional data based on Environment Agency 1km gridded rainfall dataset derived from Environment Agency intensity rain gauges. Crown copyright. All rights reserved.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

3 River flows and Groundwater levels

3.1 River flows and Groundwater level map

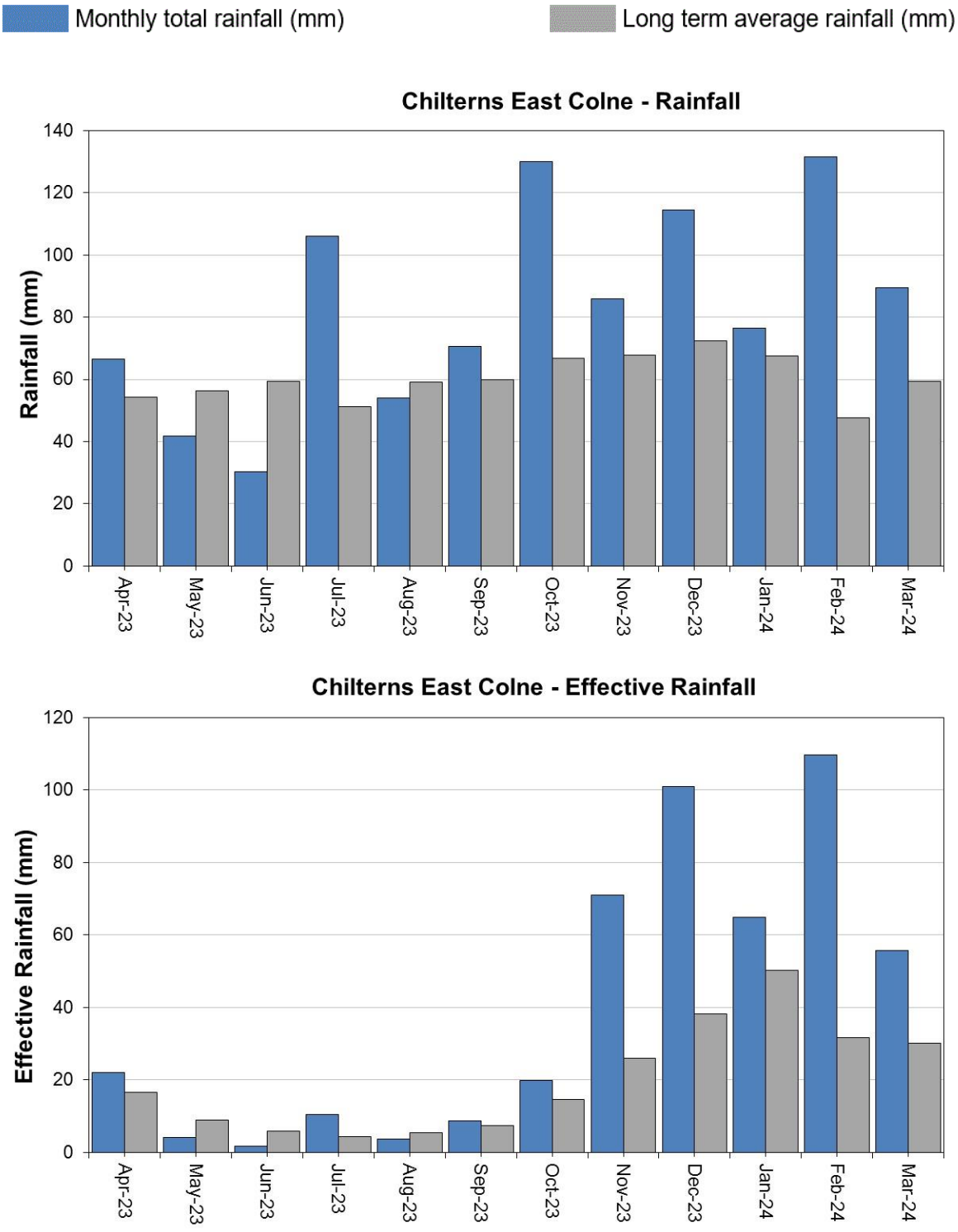
Figure 3.1: Monthly mean river flow and groundwater levels at our indicator sites for March 2024, expressed as a percentage of the respective long term average and classed relative to an analysis of historic March monthly means. Table available in the appendices with detailed information.



4 Colne Catchment

4.1 Colne Rainfall and effective rainfall charts

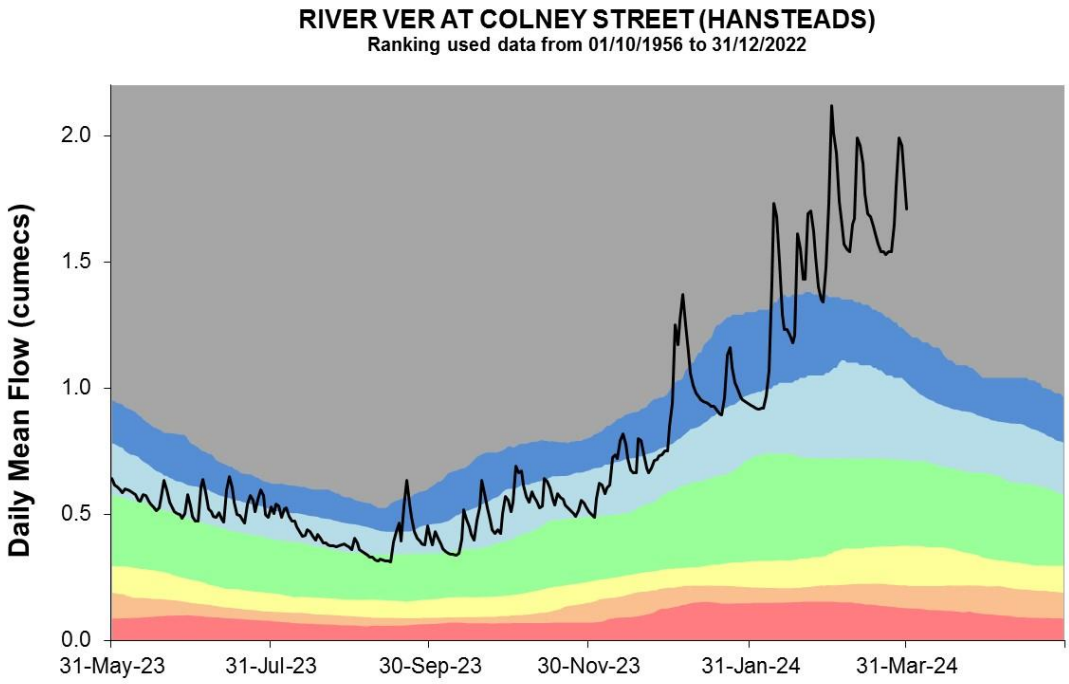
Figure 4.1: Monthly rainfall and effective rainfall totals for the past 24 months compared to the 1961 to 1990 long term average for the Colne.

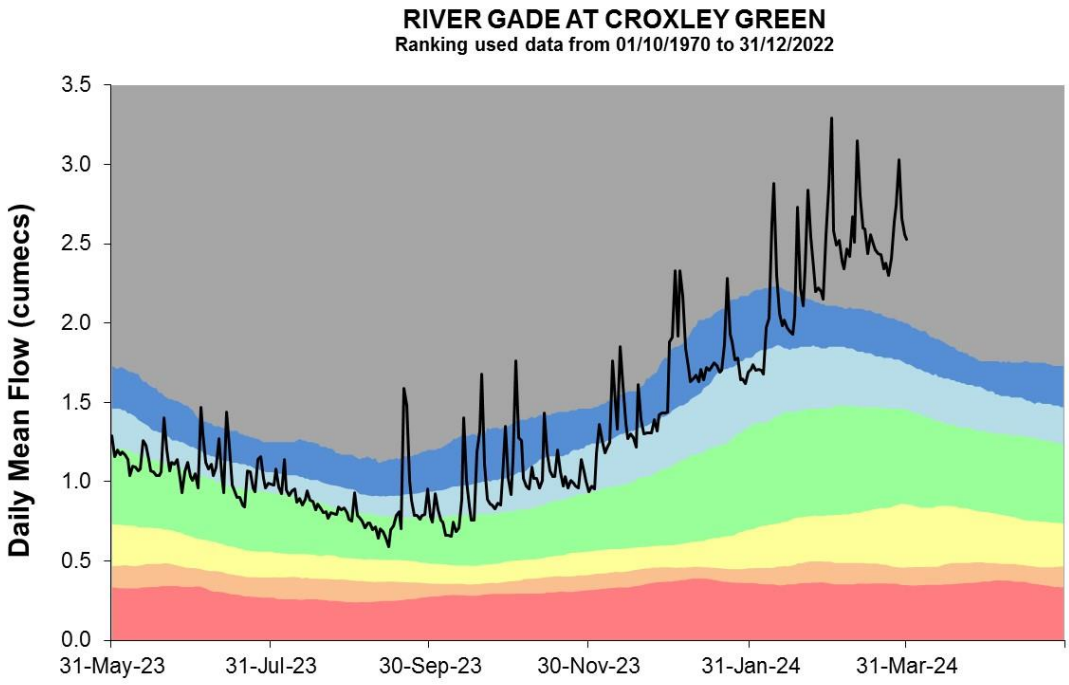


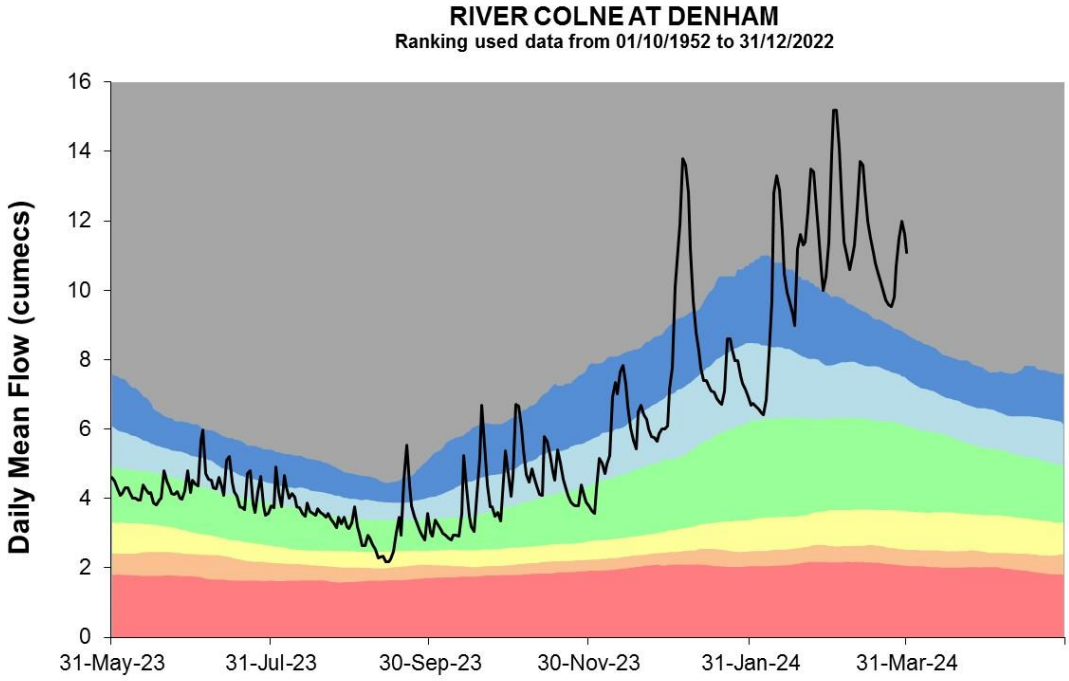
HadUK rainfall data (Source: Met Office. Crown copyright, 2024)
EA Soil Moisture Model effective rainfall data (Source: Environment Agency, 2024)

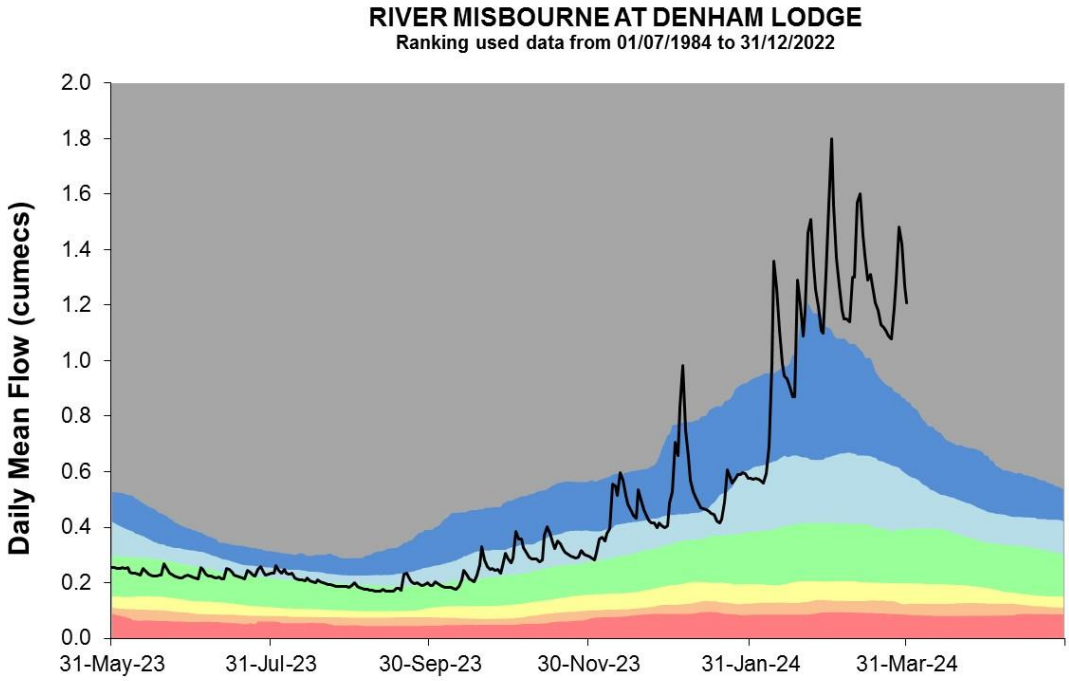
4.2 Colne River flow charts

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.





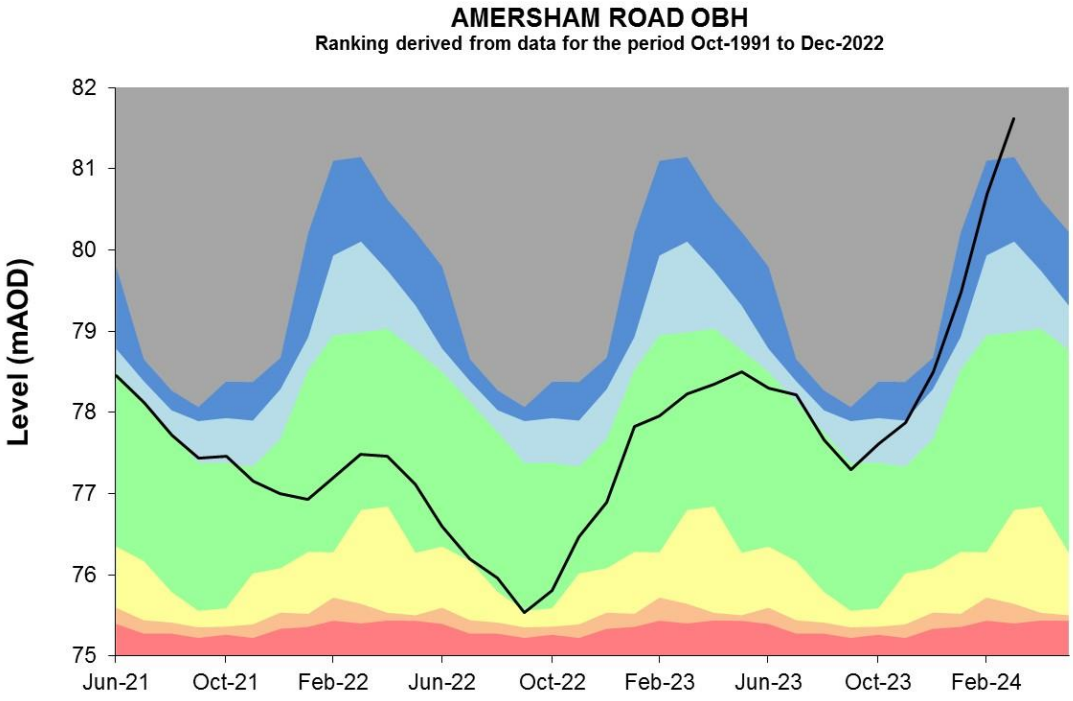


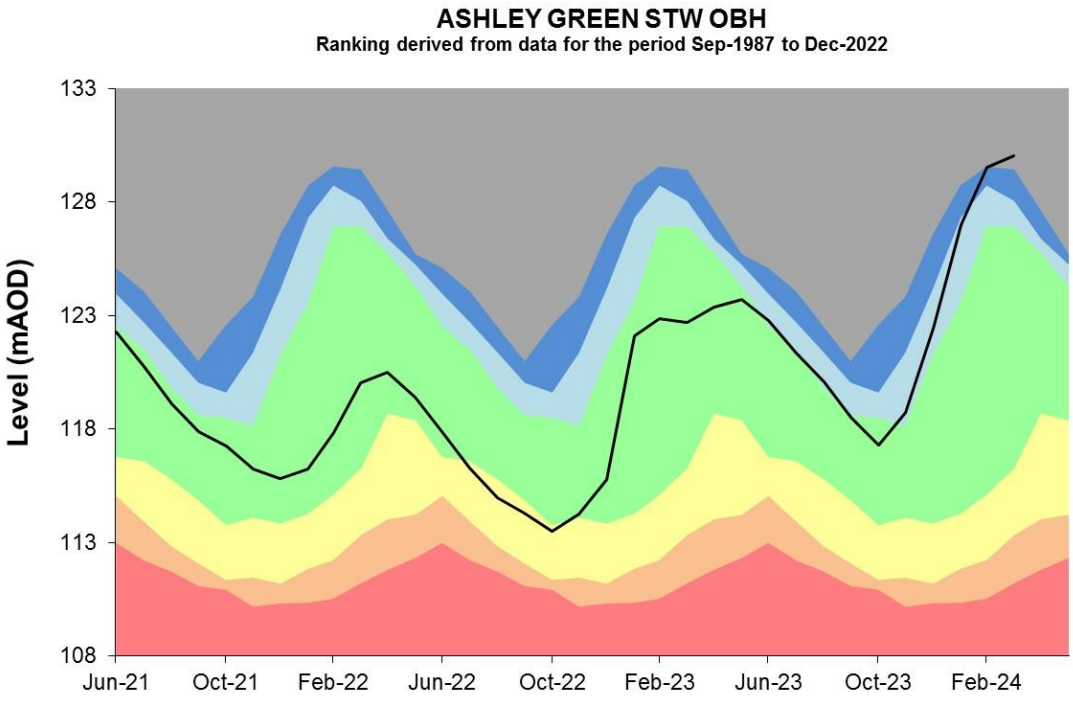


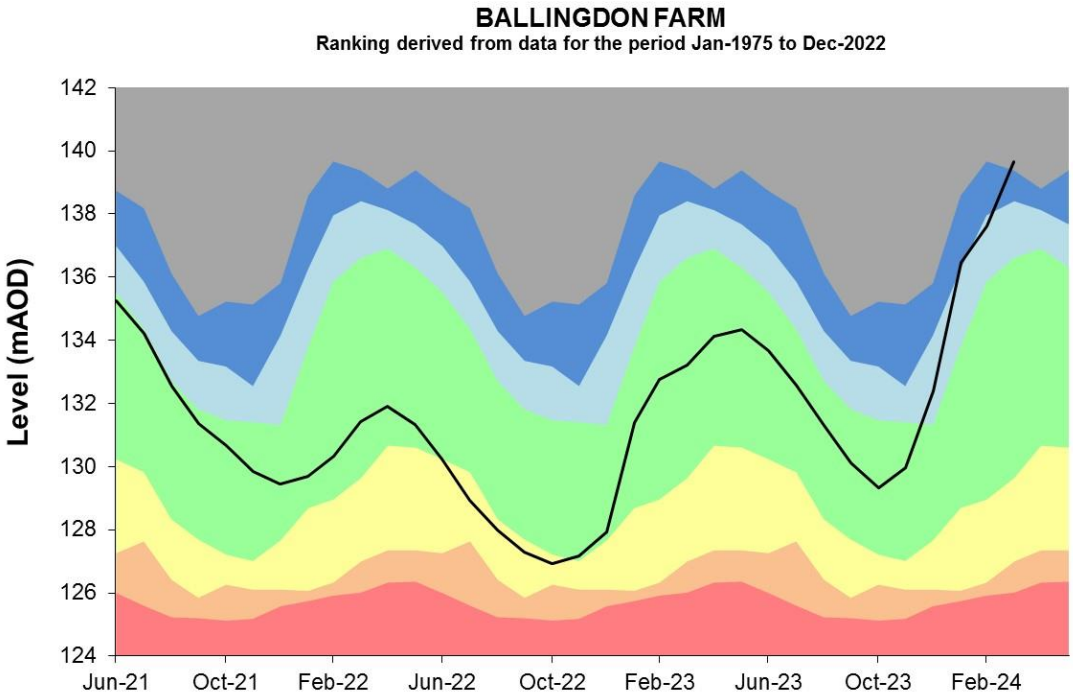
Source: Environment Agency, 2024

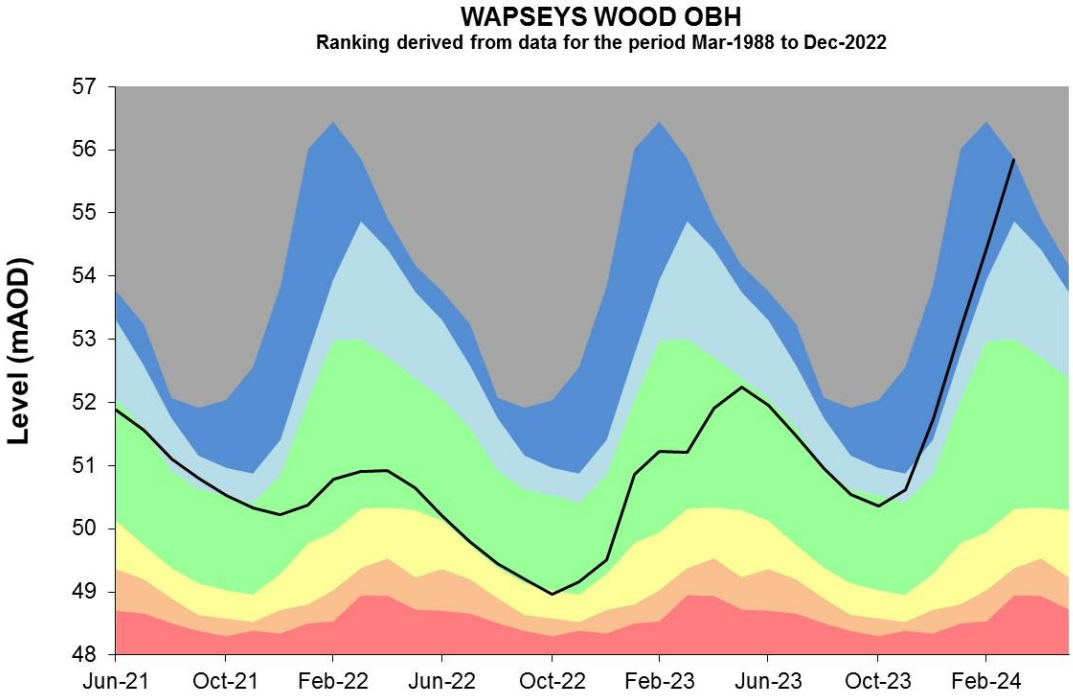
4.3 Colne Groundwater level charts

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.







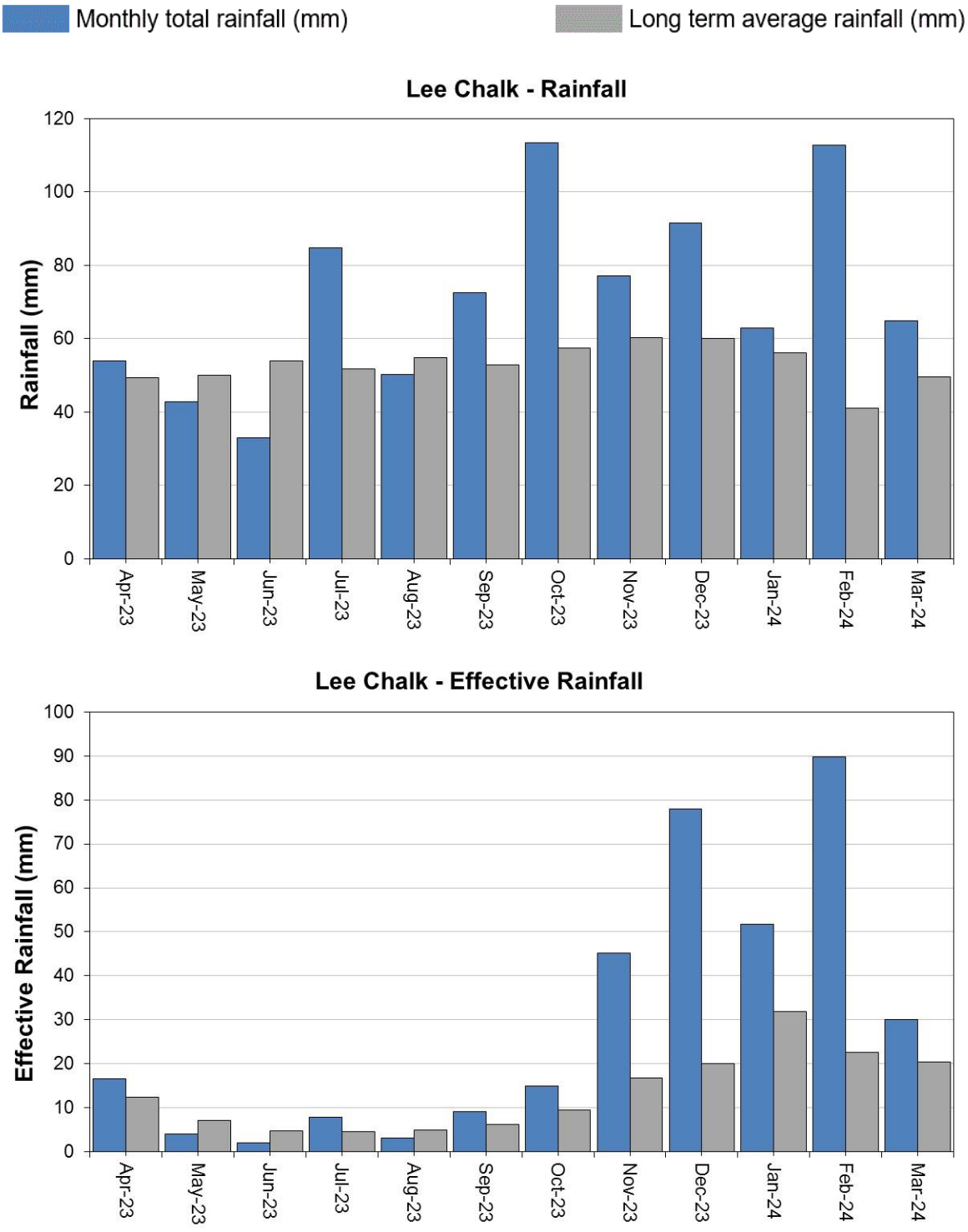


Source: Environment Agency, 2024

5 Upper Lee Catchment

5.1 Upper Lee Rainfall and Effective rainfall charts

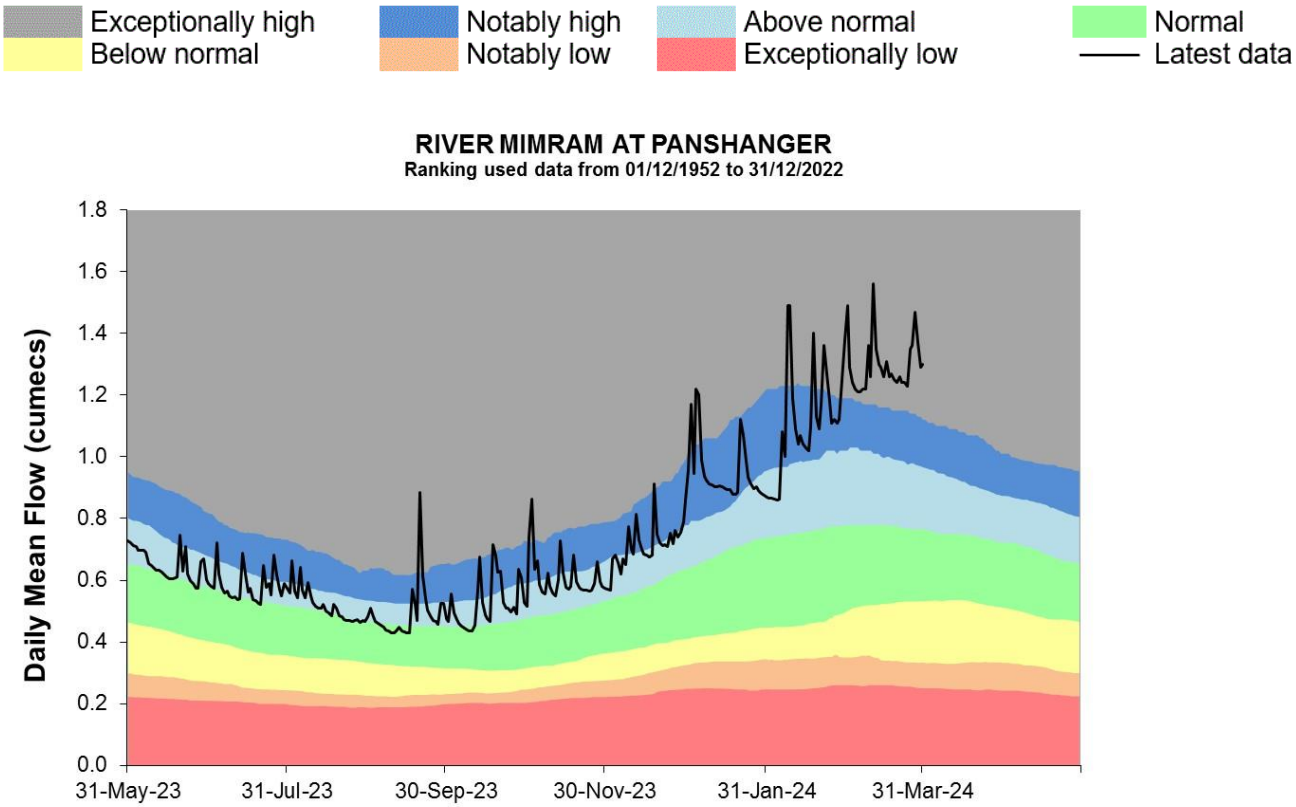
Figure 5.1: Monthly rainfall and effective rainfall totals for the past 24 months compared to the 1961 to 1990 long term average for each region and for England.

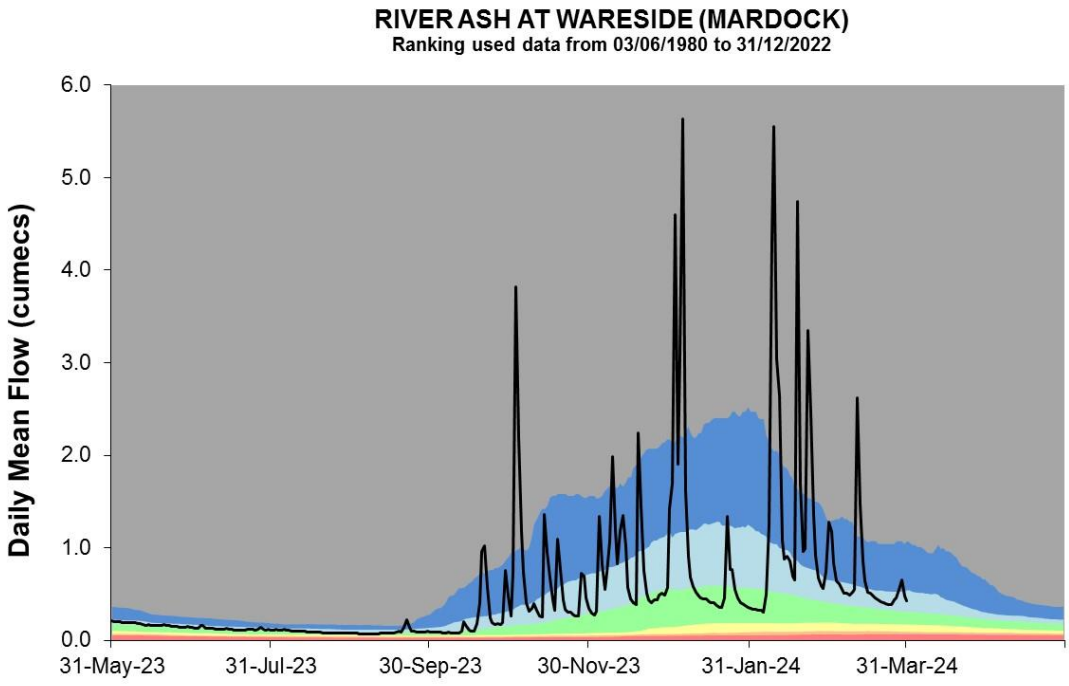


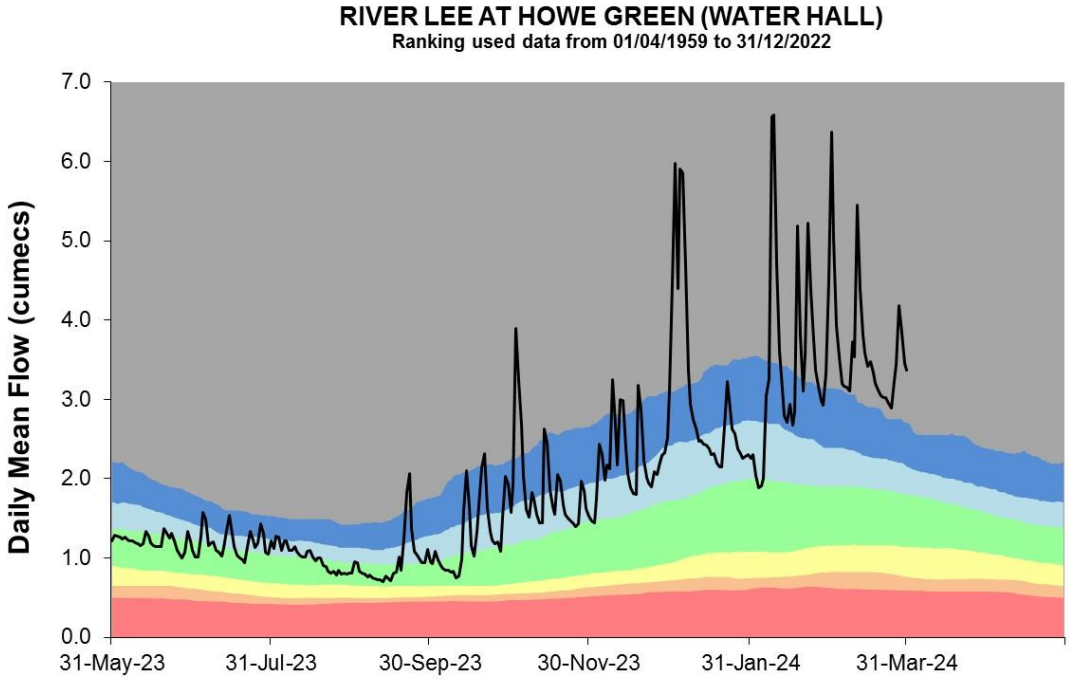
HadUK rainfall data (Source: Met Office. Crown copyright, 2024)
EA Soil Moisture Model effective rainfall data (Source: Environment Agency, 2024)

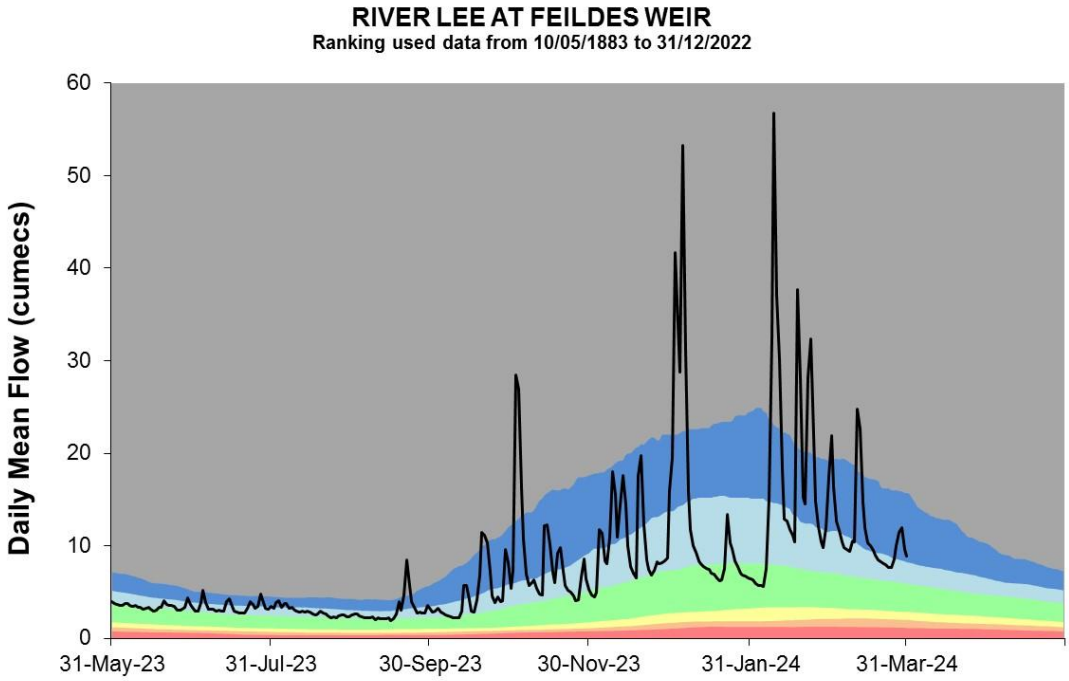
5.2 Upper Lee River flow charts

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.





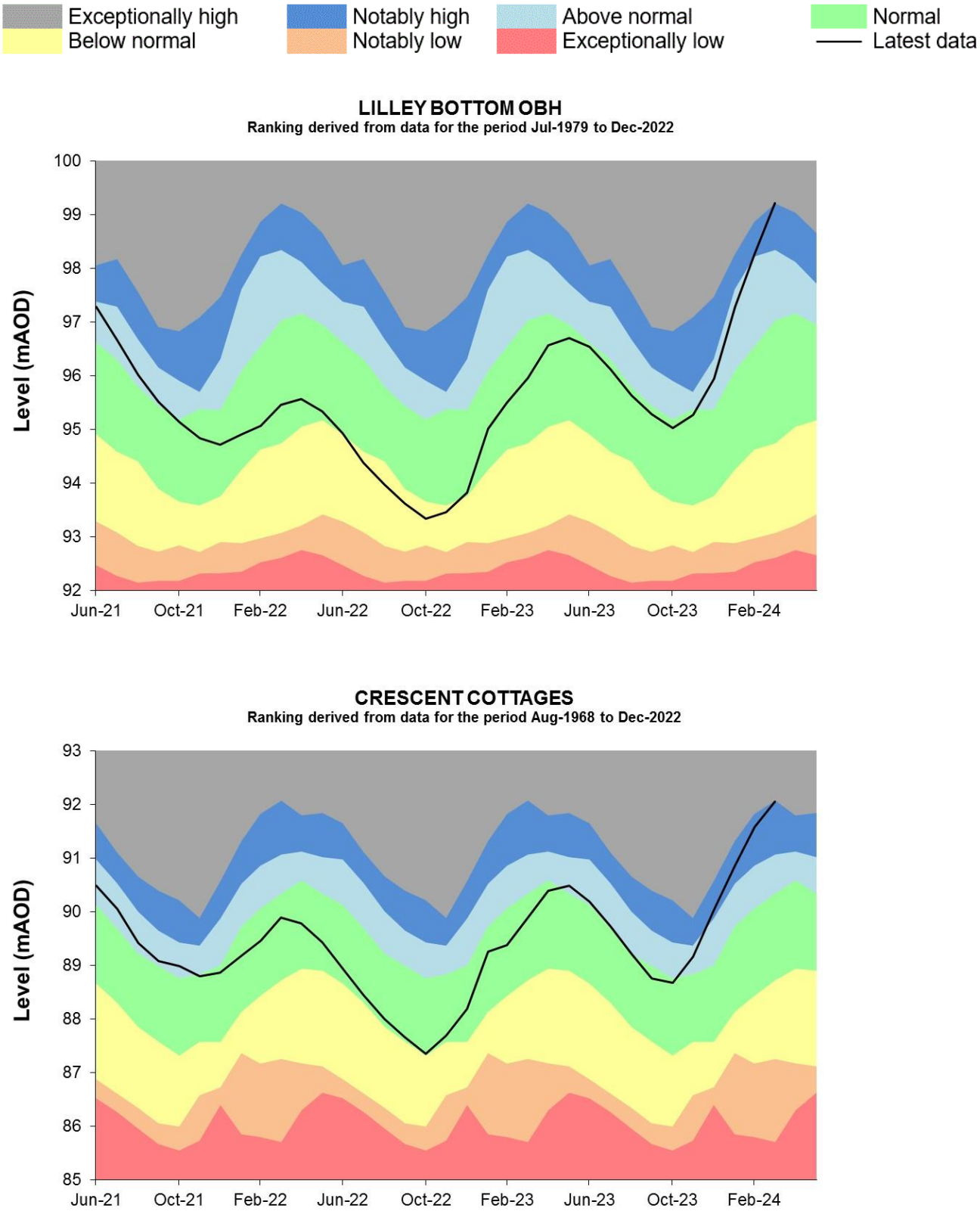




Source: Environment Agency, 2024

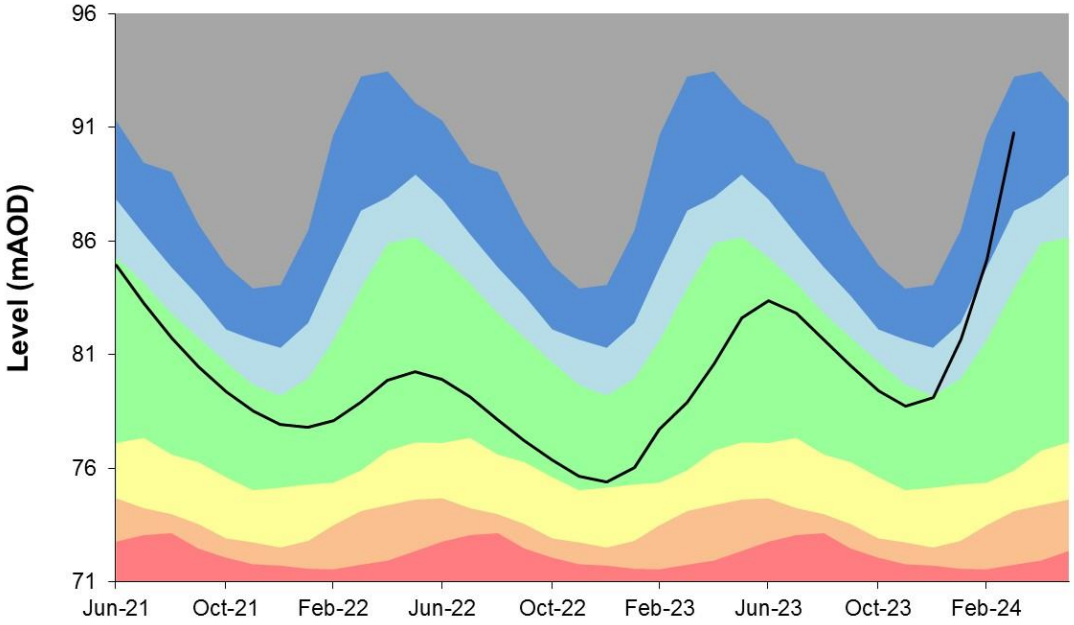
5.3 Upper Lee Groundwater level charts

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.



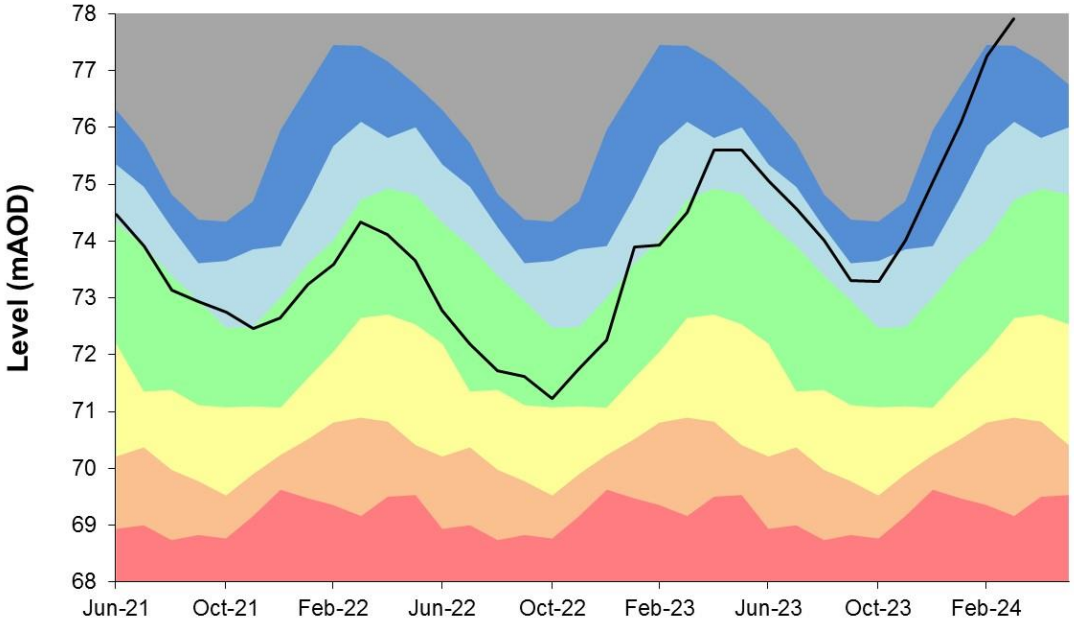
THERFIELD RECTORY

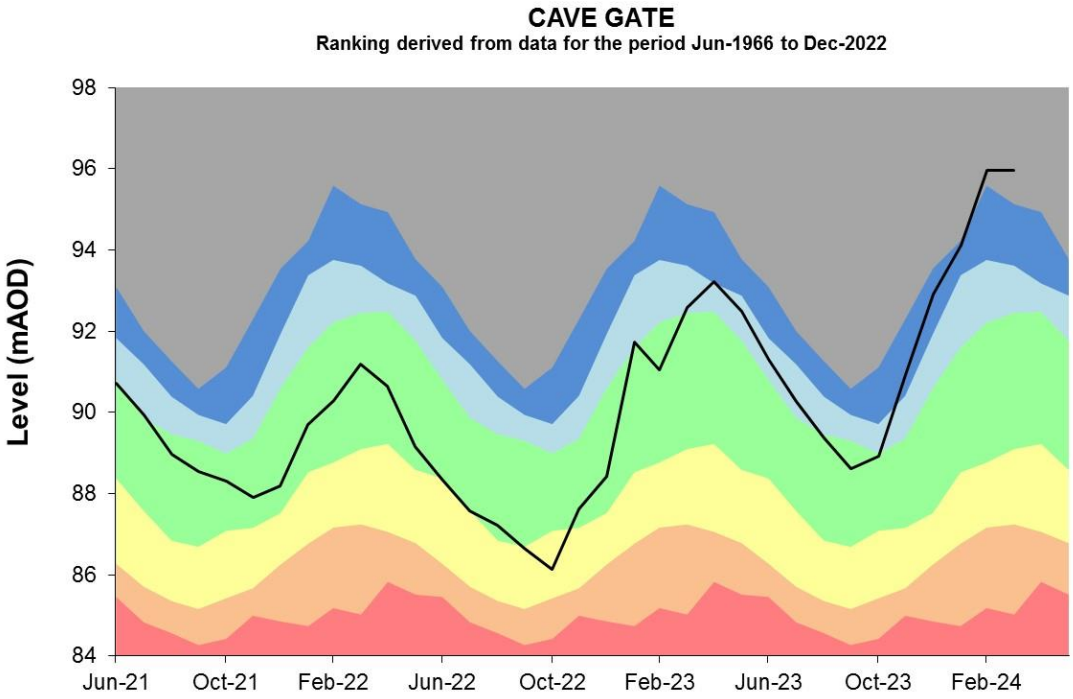
Ranking derived from data for the period Jan-1883 to Dec-2022



HIXHAM HALL

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



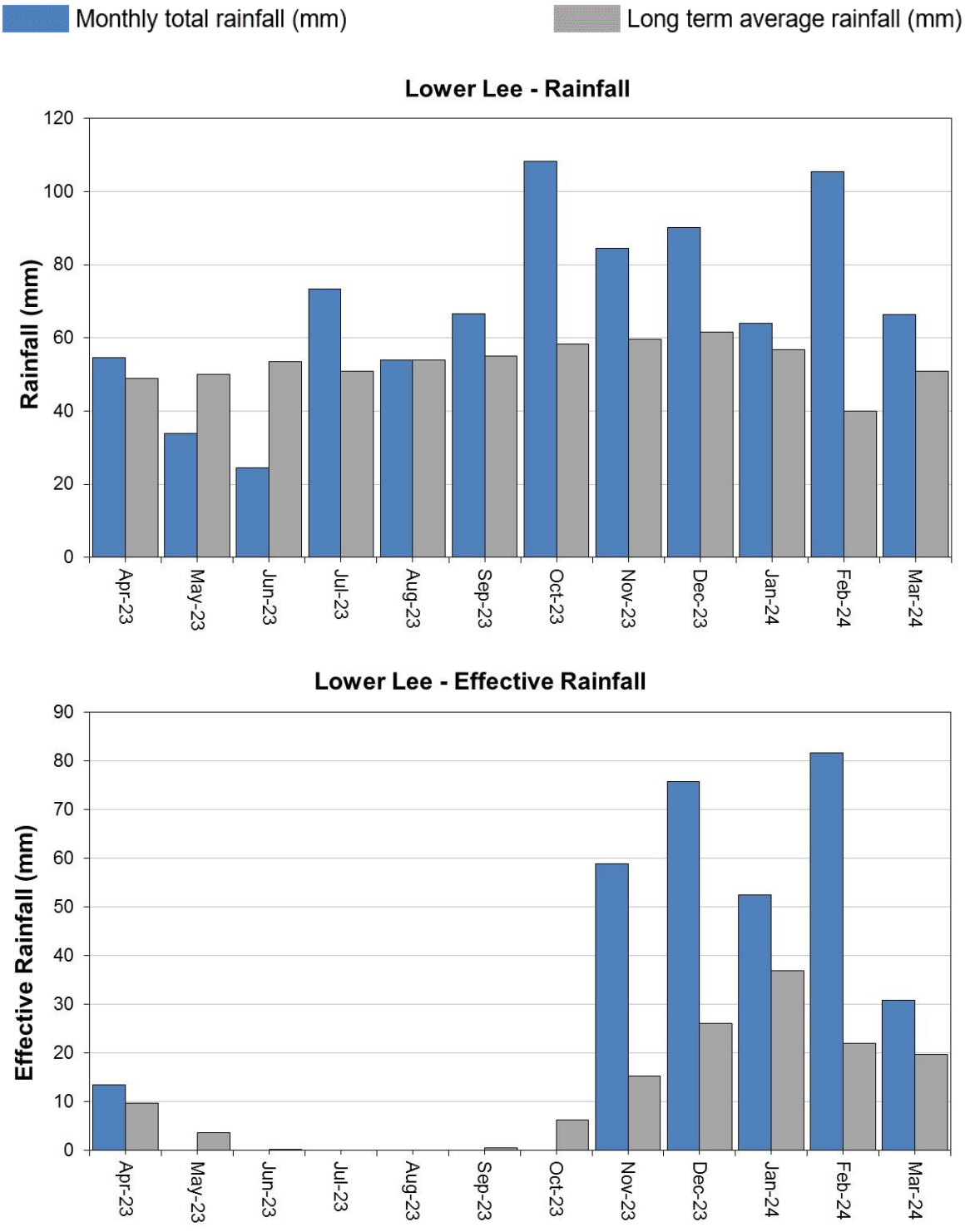


Source: Environment Agency, 2024

6 Lower Lee Catchment

6.1 Lower Lee Rainfall and Effective Rainfall charts

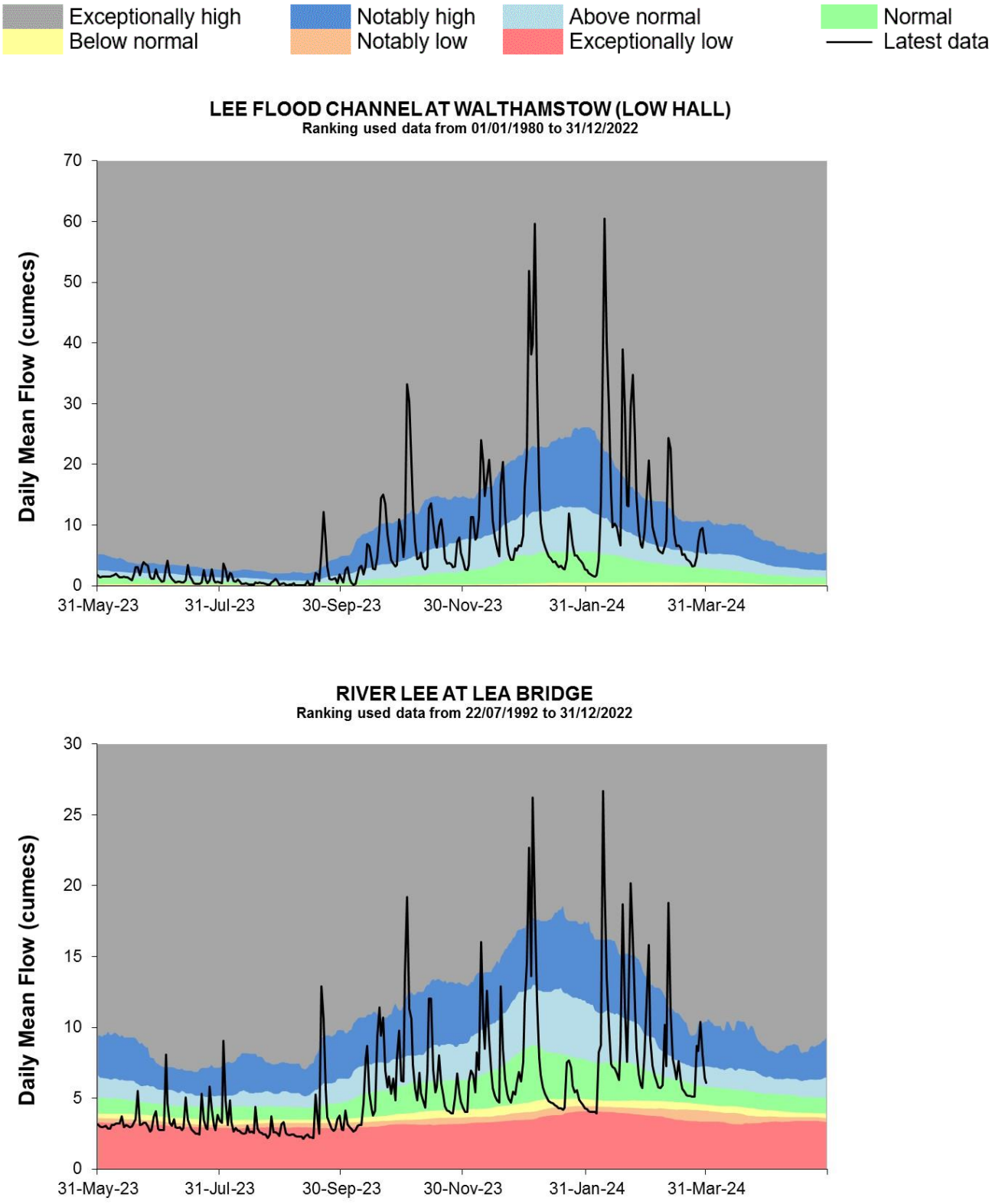
Figure 6.1: Monthly rainfall and effective rainfall totals for the past 24 months as a percentage of the 1961 to 1990 long term average for the Lower Lee.



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.

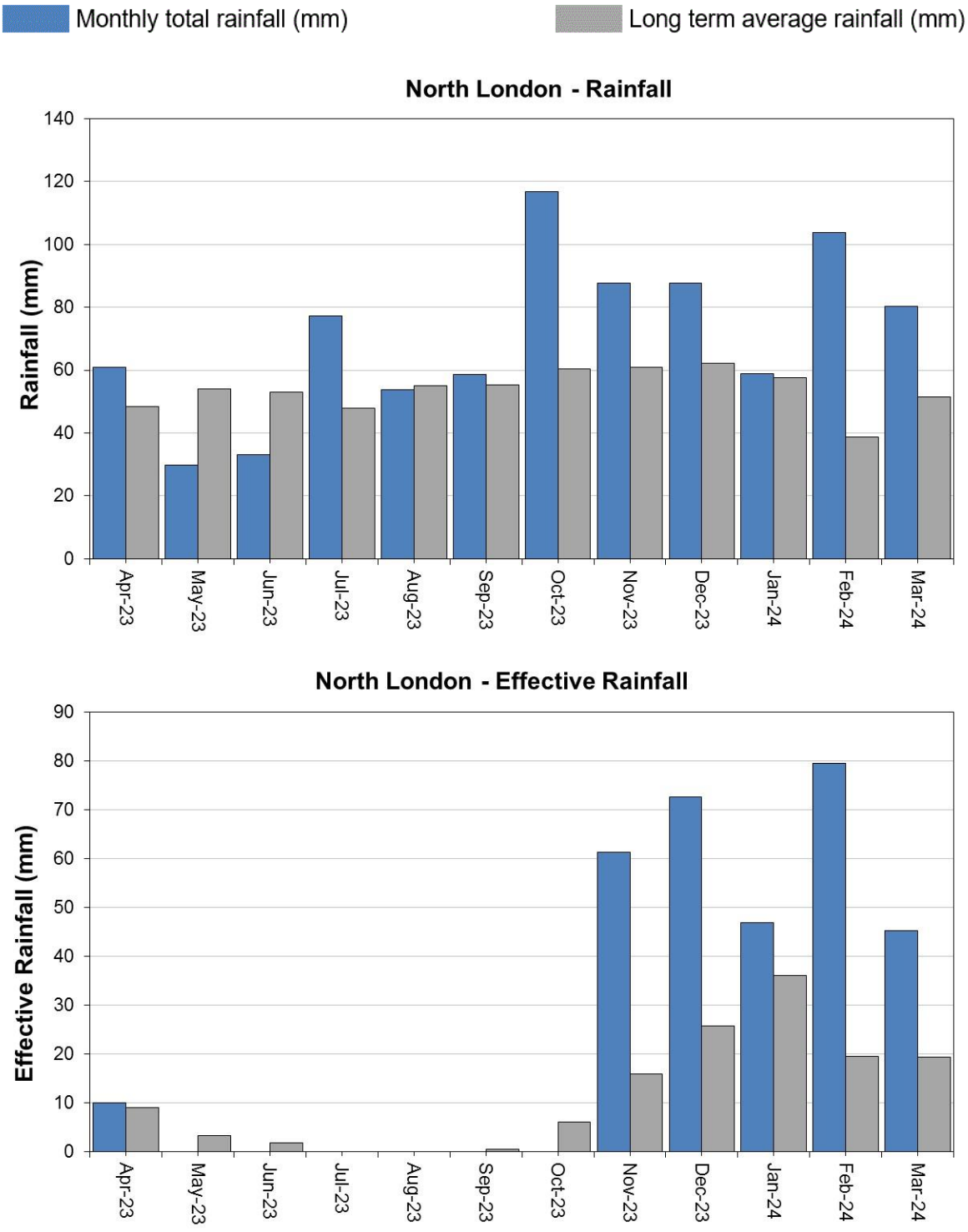


Source: Environment Agency, 2024

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 24 months compared to the 1961 to 1990 long term average for each region and for England.

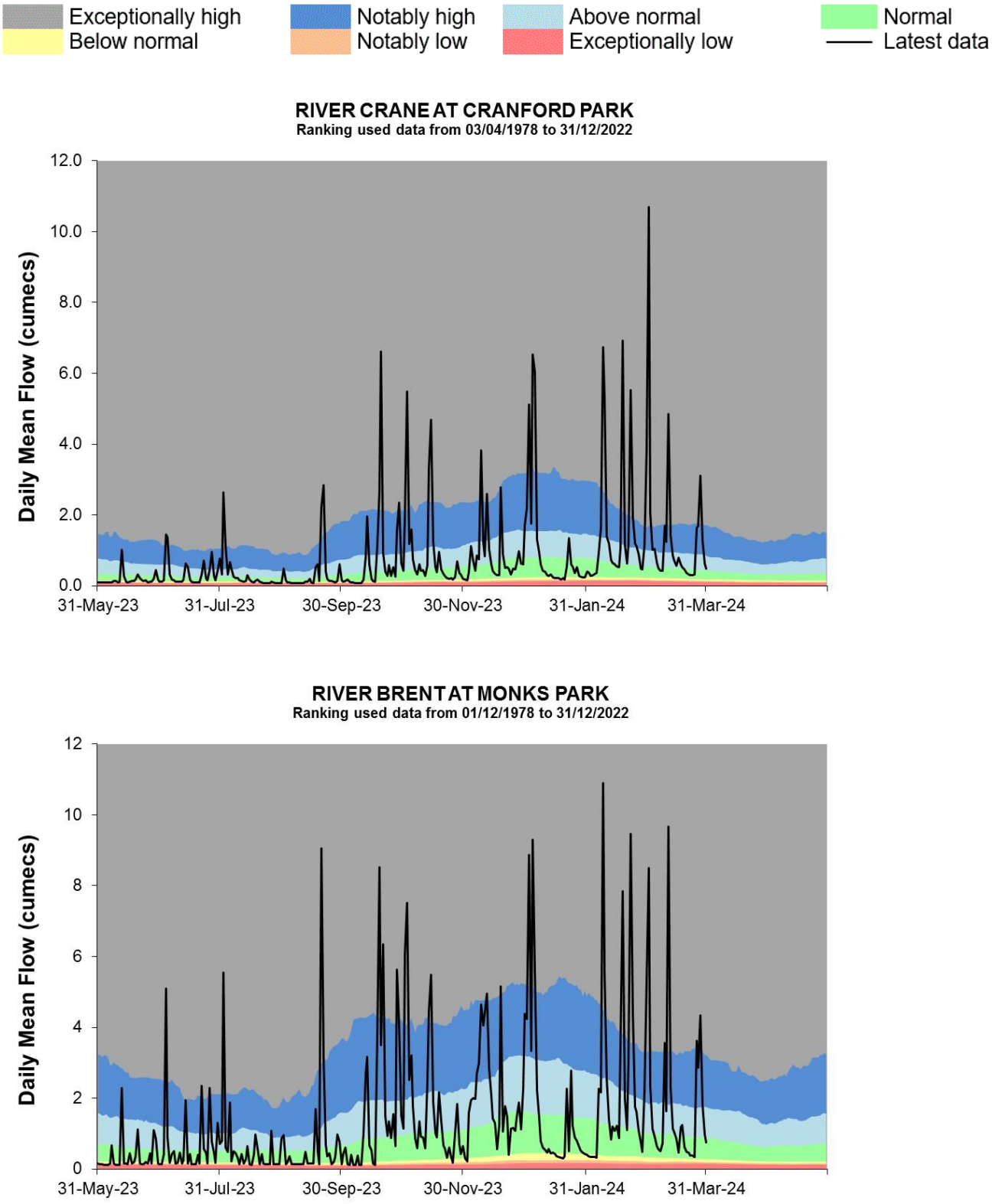


HadUK rainfall data (Source: Met Office. Crown copyright, 2024)

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.

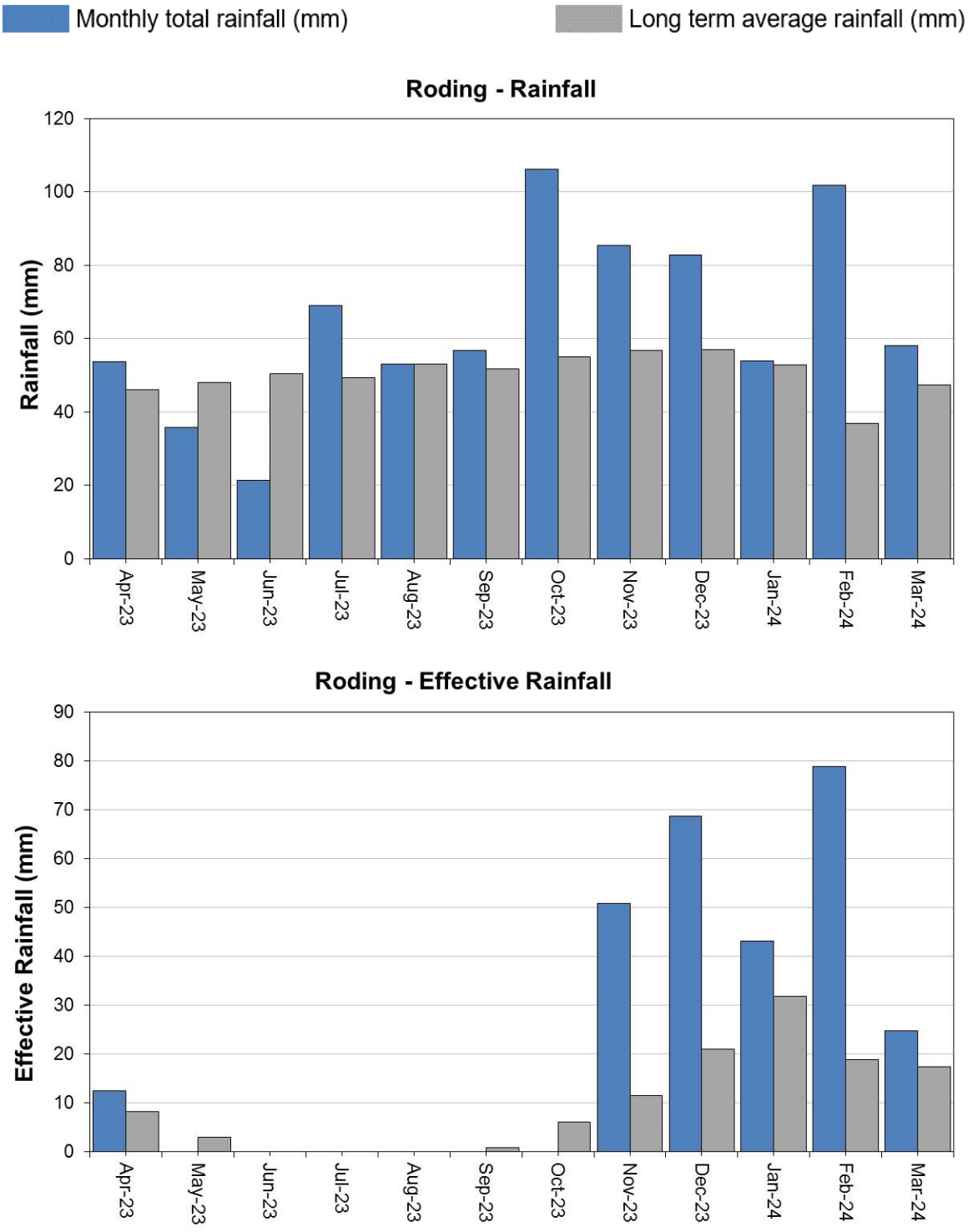


Source: Environment Agency, 2024

8 Roding Catchment

8.1 Roding Rainfall and Recharge chart

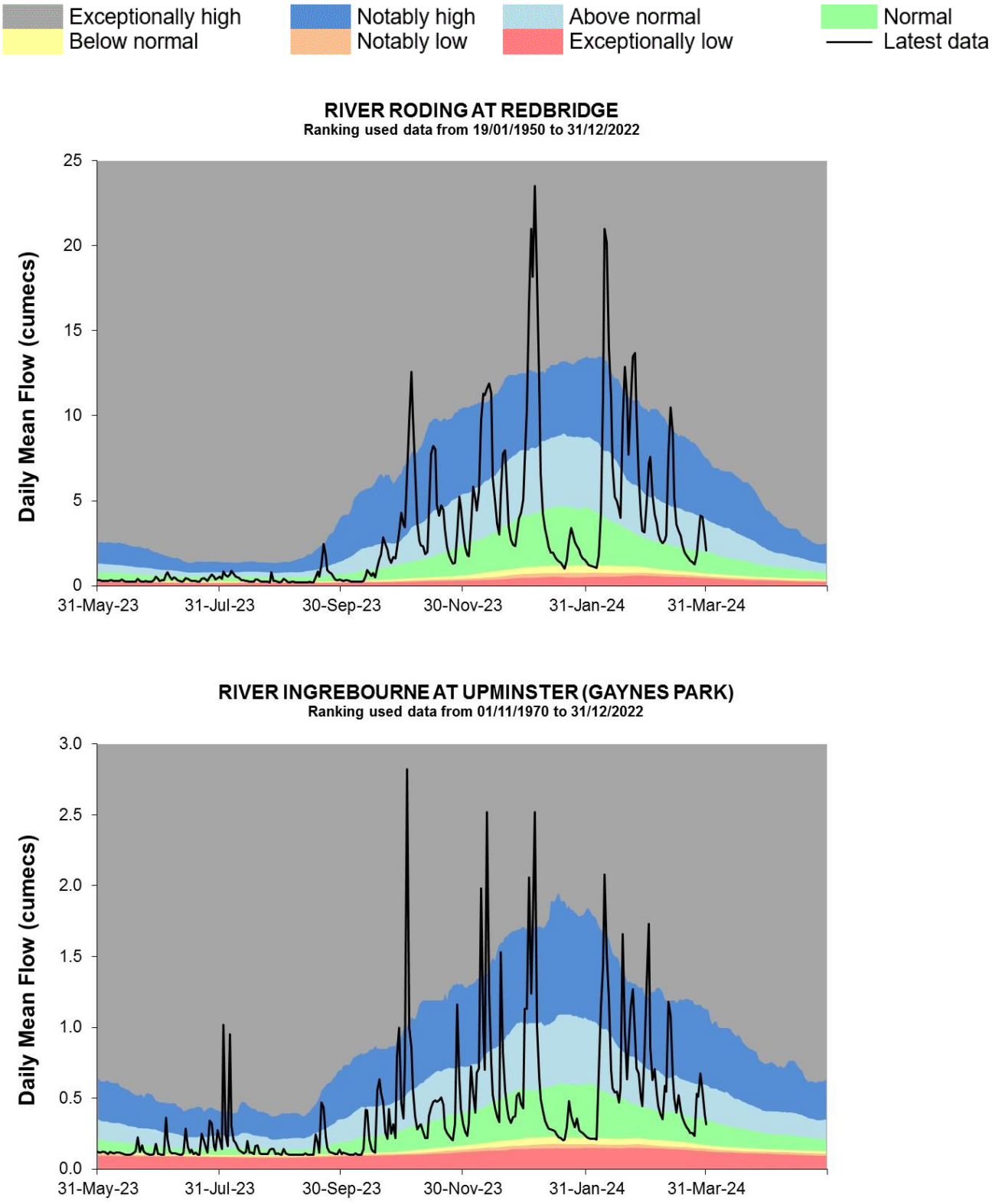
Figure 8.1: Monthly rainfall and recharge totals for the past 24 months compared to the 1961 to 1990 long term average for each region and for England.



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

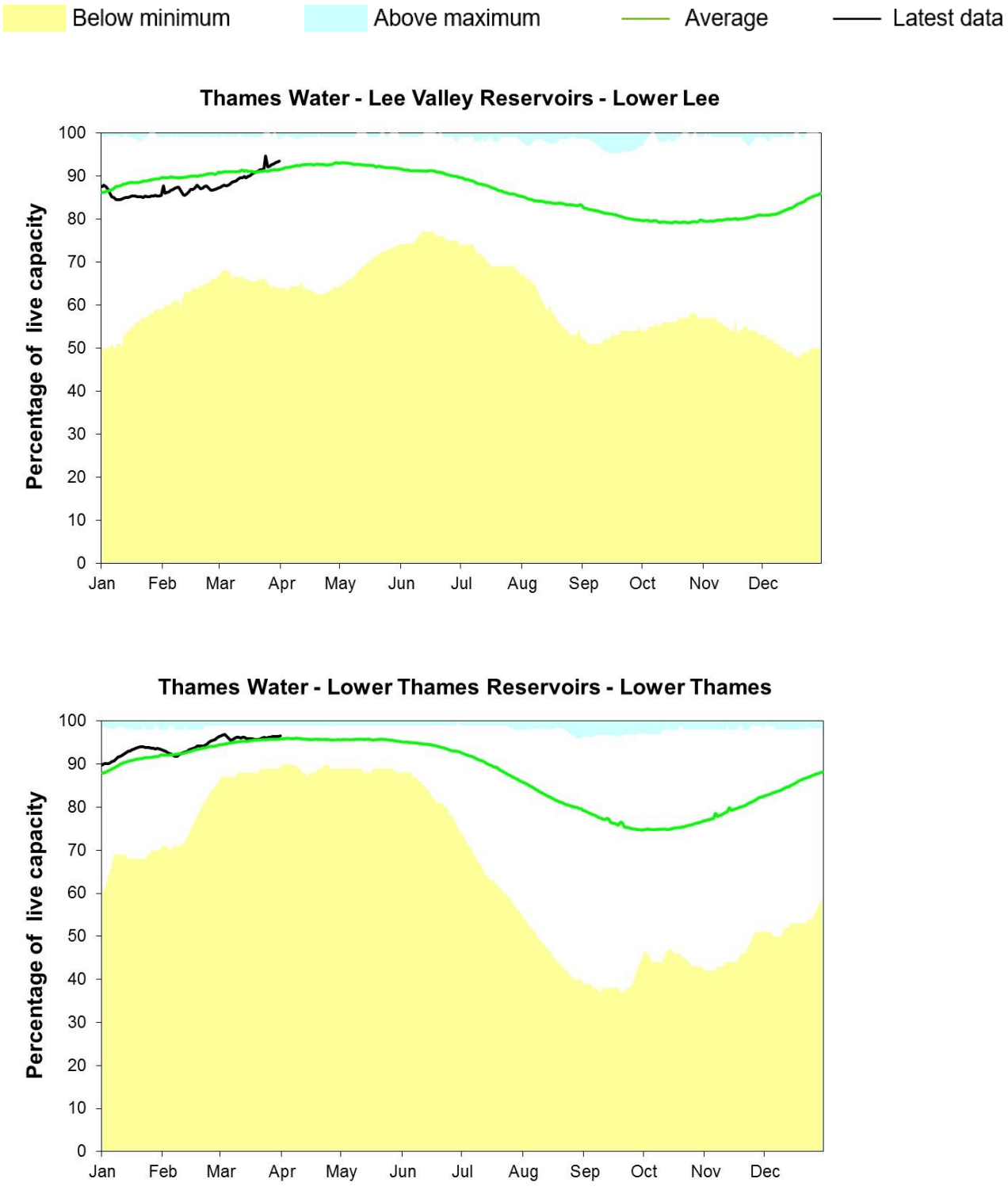
Figure 8.2: Daily mean river flow for index sites over the past year, compared to an analysis of historic daily mean flows, and long term maximum and minimum flows.



Source: Environment Agency, 2024

9 Reservoir stocks

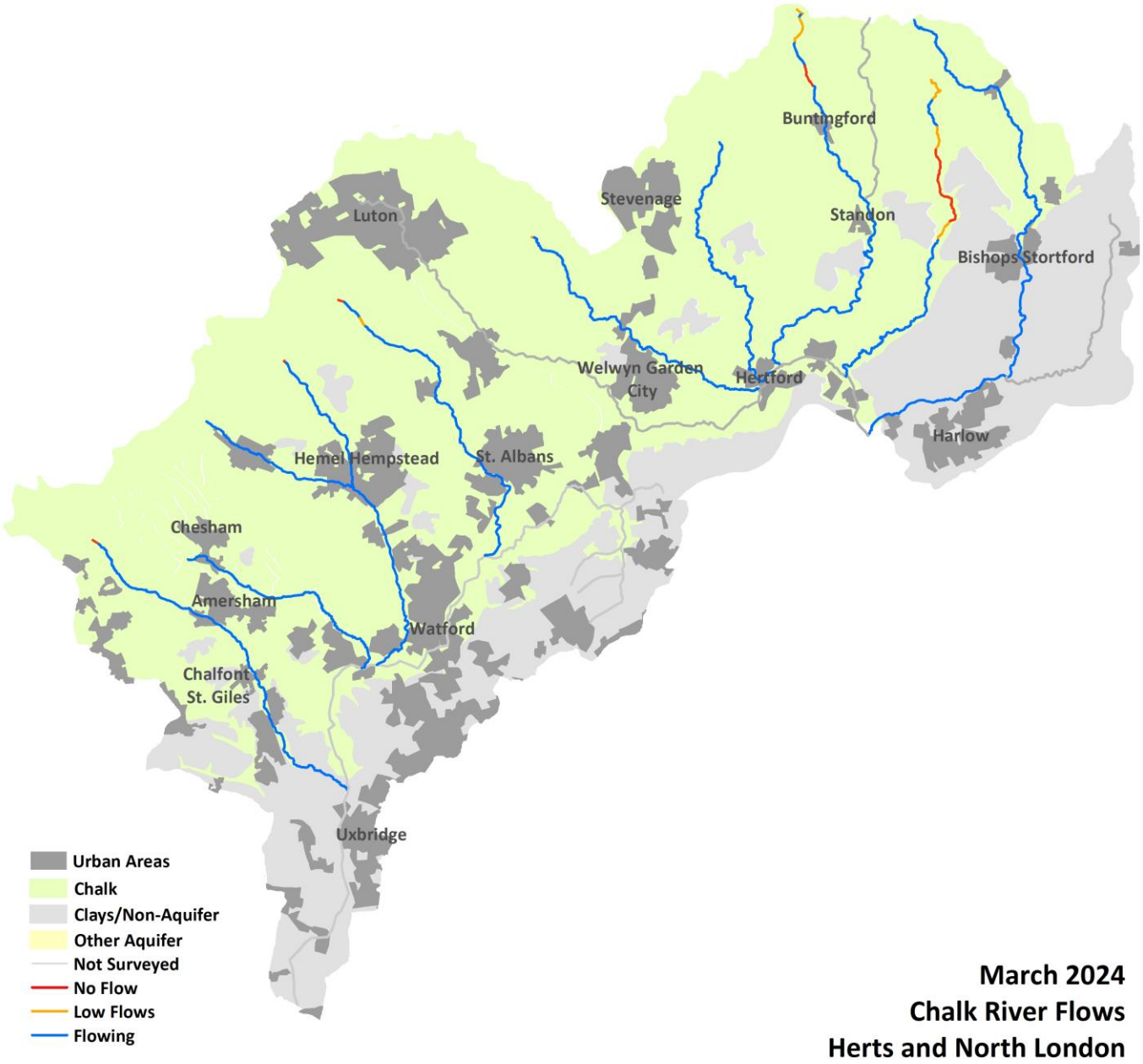
Figure 9.1: End of month reservoir stocks for the Lower Thames reservoir group and the Lee Valley reservoir group compared to long term maximum, minimum and average stocks. Note: Historic records of individual reservoirs and reservoir groups making up the regional values vary in length.



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	Mar 2024 total rainfall in mm	Mar 2024 rainfall long term average 1961 to 1990	Mar 2024 rainfall % of long term average 1961 to 1990	Winter Oct 2023 to Mar 2024 total rainfall in mm	Winter Oct 2023 to Mar 2024 rainfall % of long term average 1961 to 1990
Chilterns East Colne	90	59	151	628	164
Lee Chalk	65	50	131	523	161
Lower Lee	66	51	130	518	158
North London	80	51	156	535	161
Roding	58	47	123	489	160
Herts and North London total	72	52	138	540	161

12.2 Rainfall banding table

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

12.3 Effective Rainfall table

Hydrological area	Mar 2024 total effective rainfall in mm	Mar 2024 effective rainfall long term average 1961 to 1990 in mm	Mar 2024 effective rainfall % of long term average 1961 to 1990	Winter Oct 2023 to Mar 2024 total effective rainfall in mm	Winter Oct 2023 to Mar 2024 effective rainfall % of long term average 1961 to 1990
Chilterns East Colne	56	30	184	422	221
Lee Chalk	30	20	148	310	256
Lower Lee	31	20	158	300	239
North London	45	19	234	306	250
Roding	25	17	144	266	250
Herts and North London total	37	21	175	321	241

12.4 Soil Moisture Deficit table

Hydrological area	Mar 2024 end of month Soil Moisture Deficit in mm	Mar 2024 end of month Soil Moisture Deficit long term average 1961 to 1990 in mm	Feb 2024 end of month Soil Moisture Deficit in mm	Feb 2024 end of month Soil Moisture Deficit long term average 1961 to 1990 in mm
Chilterns East Colne	2	8	0	4
Lee Chalk	1	12	0	9
Lower Lee	2	10	0	5
North London	3	11	0	6
Roding	3	11	0	7
Herts and North London total	2	10	0	6

12.5 River flows table

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

12.6 Groundwater table

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

12.7 Abstraction licence flow constraints

Number of flow constraints in force between 1 and 4 March 2024	Number of flow constraints in force between 5 and 11 March 2024	Number of flow constraints in force between 12 and 18 March 2024	Number of flow constraints in force between 19 and 25 March 2024
2	3	7	9