Monthly water situation report: Thames Area

1 Summary - February 2024

Thames Area received almost triple the expected amount of rain in February, a record for this month. Most of the month's rainfall fell over three consecutive days at the beginning of the month. Soils were saturated and the soil moisture deficit (SMD) across Thames Area was zero, lower than normal for the time of the year. During particularly wet days our river flow sites responded rapidly, mostly by surface water runoff, but also from persistently high groundwater levels in aquifer supported catchments. High groundwater levels were a result of the high recharge received in January and throughout February, with all but one of our groundwater indicator sites ending the month exceptionally high or notably high.

1.1 Rainfall

This February was the wettest on record, with a total of 134mm of rain, 281% of the long term average (LTA). Rain fell consistently over Thames Area, with no particular spatial trends. Unsurprisingly, all areal units were classed as having exceptionally high rainfall for the time of year, with five (Cotswold – East, Berkshire Downs, Upper Thames, Upper Cherwell and Thame) having their highest rainfall. Following a dry start, 47mm of rain fell over the 6 to 8 February and 22mm on 17 February. Thames Area has received 173% of the expected rainfall for the winter period until the end of February.

1.2 Soil moisture deficit and recharge

February's rainfall meant that the SMD ended the month in Thames Area at 0mm, a decrease from the month before. Soils were wetter than expected for the time of year, and with fully saturated soils, effective rainfall was 354% of the LTA in February. All the areal units received at least triple the expected effective rainfall for February, with the Cut areal unit receiving almost four and a half times the expected amount. So far for the winter period, Thames Area has received 247% of the expected effective rainfall.

1.3 River flows

Saturated soils across the Thames Area allowed rivers to respond quickly to February's rainfall, and most of our indicator flow sites were classed as notably high. Four sites were classed as exceptionally high, two of these being Marlborough and Tilford. They were supported by already high groundwater levels, but also reacted strongly to the month's rainfall to maintain exceptionally high flows, achieving their second and third highest February flows, respectively. The other two, Banbury and Abingdon, experienced high runoff rates from their clay catchments, achieving their highest and second highest flows for February, respectively.

1.4 Groundwater levels

The high recharge for February resulted in groundwater levels at all the indicator sites increasing in varying amounts. The three Oolite sites experienced a rise in level, moving from a normal banding in January, to above normal (Jackaments Bottom), notably high (Ampney Crucis) and exceptionally high (Fringford). Having started the month with already high groundwater levels, the Chalk sites showed a mixed rise in level, but all ending the month with exceptionally high groundwater levels, apart from Tile Barn Farm, ending the month as notably high. Finally, groundwater levels in the Lower Greensand were also notably high for the time of year.

1.5 Reservoir stocks

Reservoir stocks in the Lower Thames reservoir were 96% at the end of February, an increase from 93.3% at the end of January. Stocks in Farmoor reservoir were 85% at the end of February, a decrease from 91.8% at the end of January.

1.6 Environmental impact

During February, there were 72 flood alerts and 20 flow warnings issued in Thames Area. There were also two groundwater flood alerts in force for the month. At the end of February, no abstraction licenses were being constrained in the area to protect water resources and the environment.

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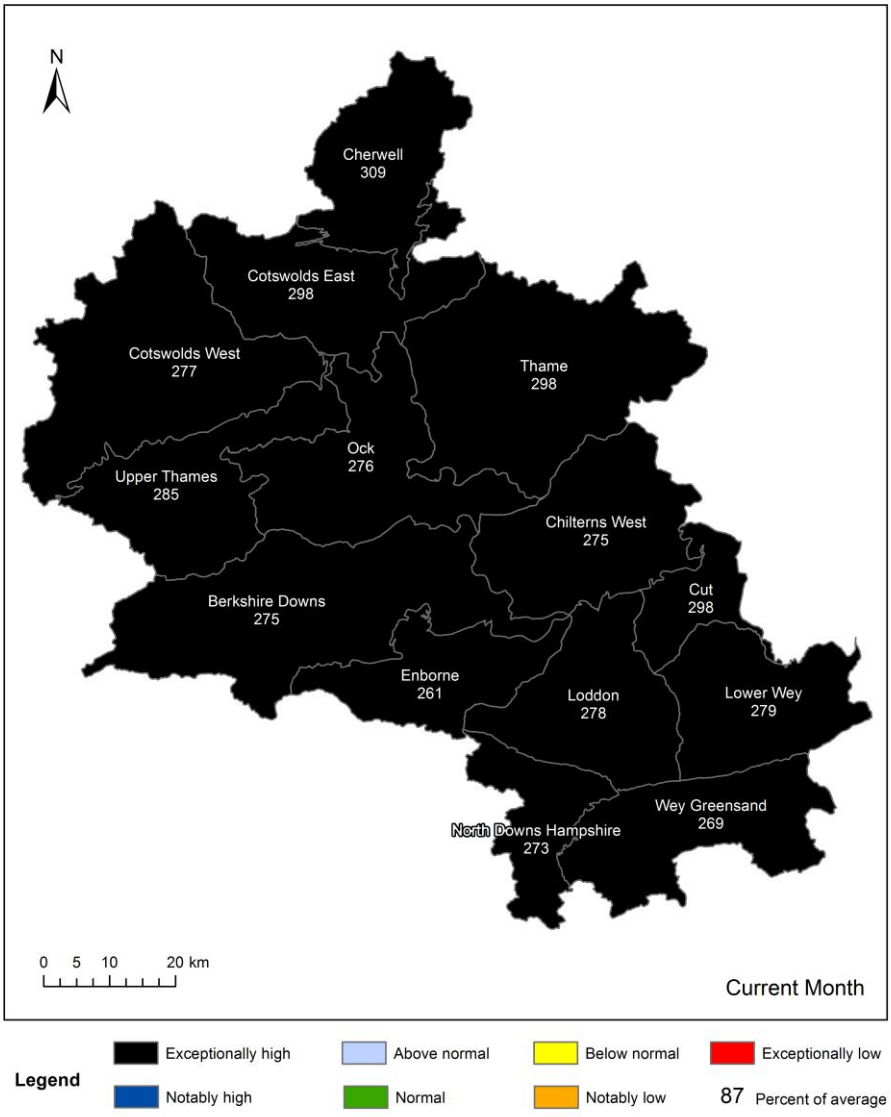
2 Rainfall

2.1 Rainfall map

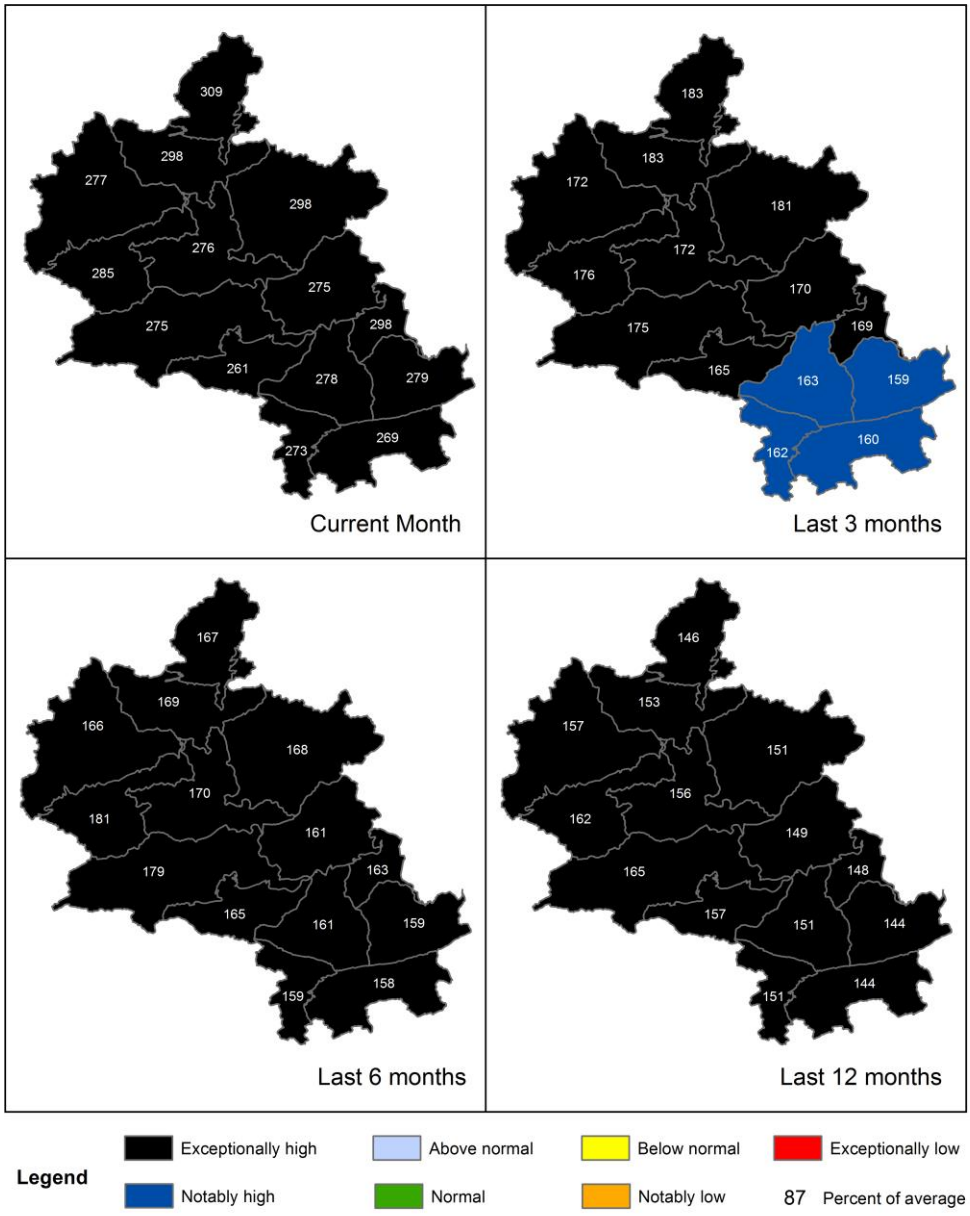
Figure 2.1: Total rainfall for hydrological areas for the current month (up to 29 February 2024), classed relative to an analysis of respective historic totals. Table available in the appendices with detailed information.



Rainfall data for 2023, extracted from Environment Agency 1km gridded rainfall dataset derived from Environment Agency intensity rain gauges. (Source: Environment Agency. Crown Copyright, 100024198, 2024). Rainfall data prior to 2023, extracted from Met Office HadUK 1km gridded rainfall dataset derived from registered rain gauges (Source: Met Office. Crown copyright, 2024).

2.2 Rainfall map (2)

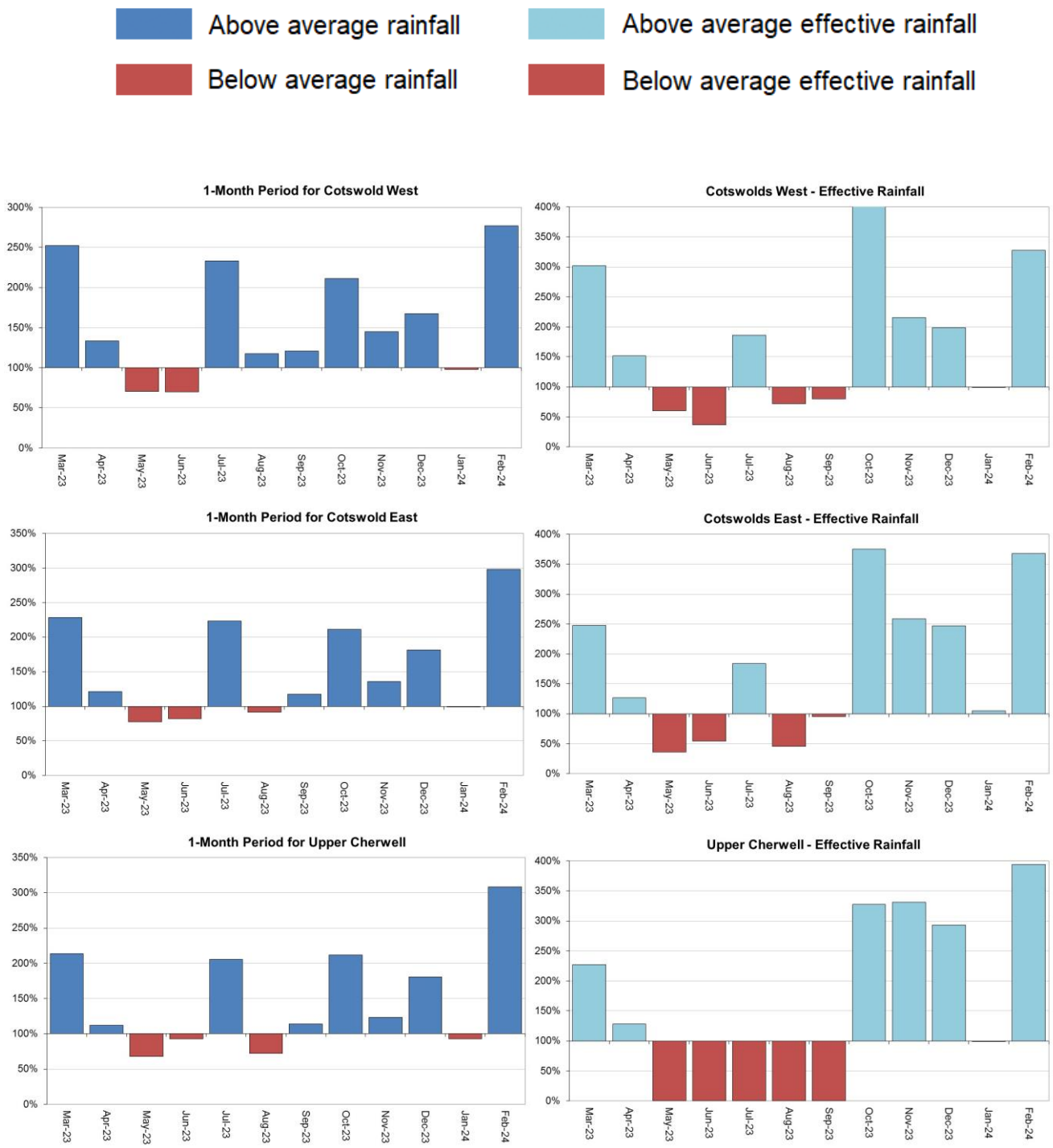
Figure 2.2: Total rainfall for hydrological areas for the current month (up to 29 February 2024), the last 3 months, the last 6 months, and the last 12 months, classed relative to an analysis of respective historic totals. Table available in the appendices with detailed information.

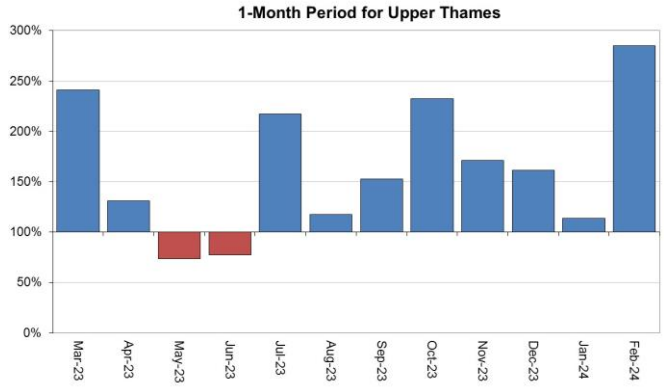


HadUK data based on the Met Office 1km gridded rainfall dataset derived from rain gauges (Source: Met Office. Crown copyright, 2024). Provisional data based on Environment Agency 1km gridded rainfall dataset derived from Environment Agency intensity rain gauges. Crown copyright. All rights reserved.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

2.3 Rainfall charts

Figure 2.3: Monthly rainfall totals for the past 12 months as a percentage of the 1961 to 1990 long term average for each areal unit.




1-Month Period for Upper Thames
300%
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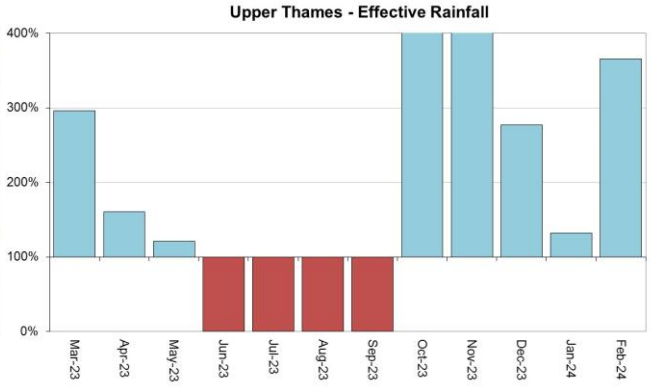
Upper Thames - Effective Rainfall
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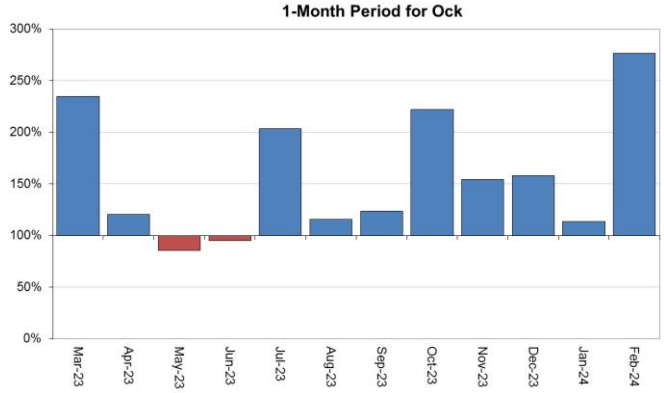
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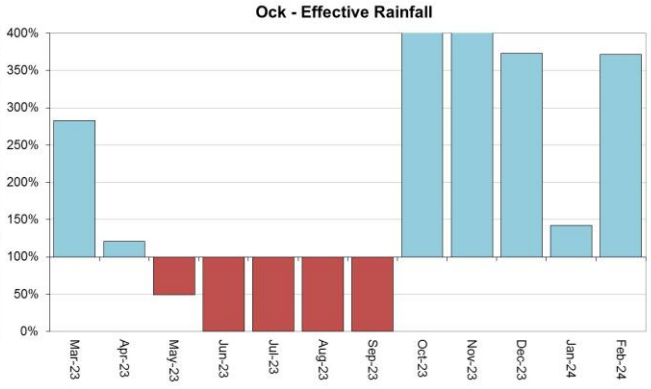
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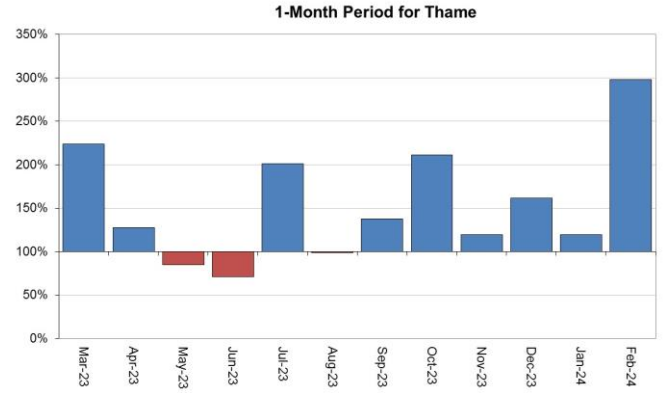
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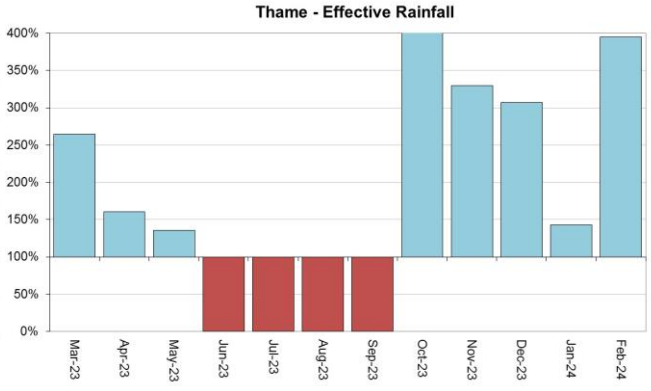
Thame - Effective Rainfall
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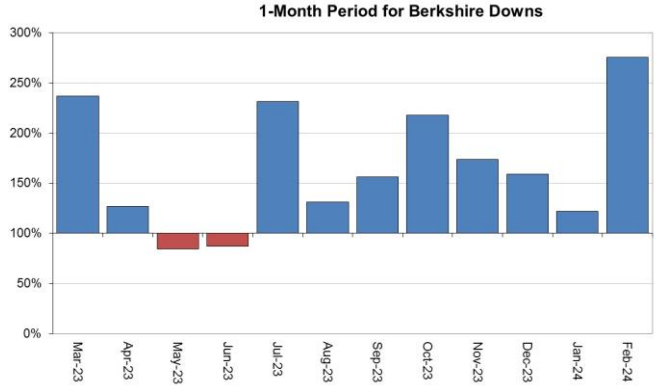
1-Month Period for Berkshire Downs
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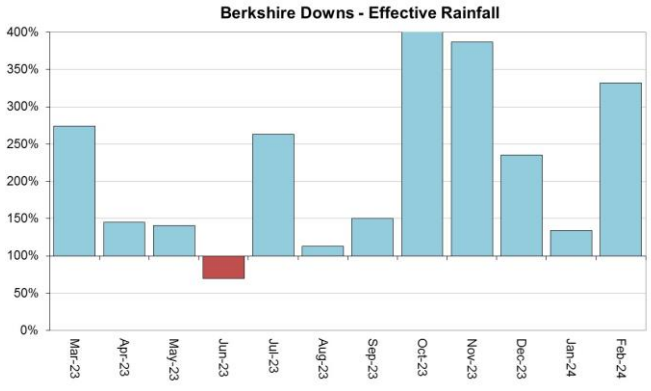
Berkshire Downs - Effective Rainfall
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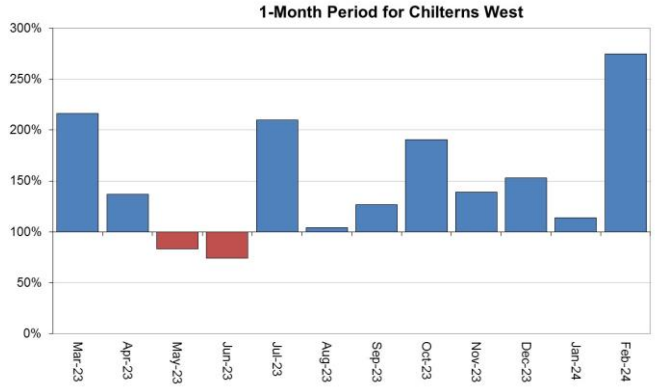
1-Month Period for Chilterns West
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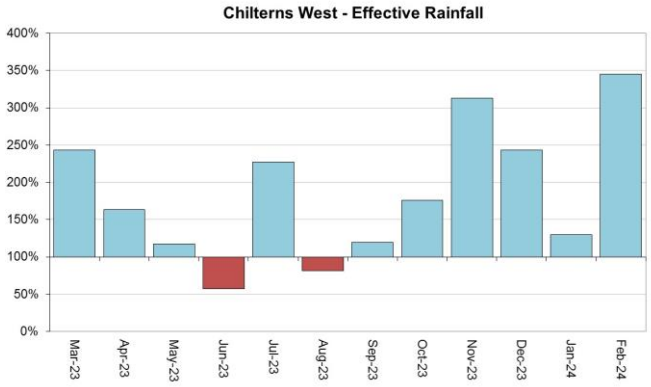
Chilterns West - Effective Rainfall
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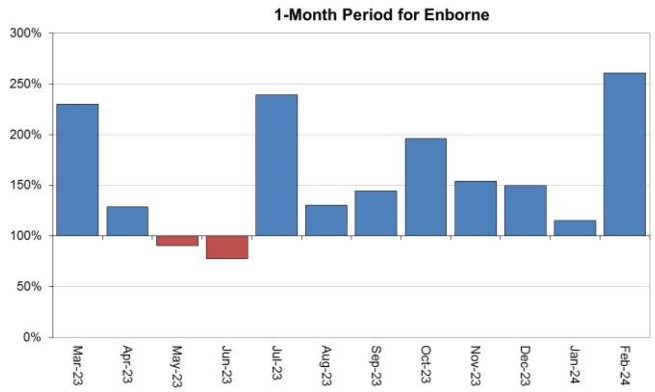
1-Month Period for Enborne
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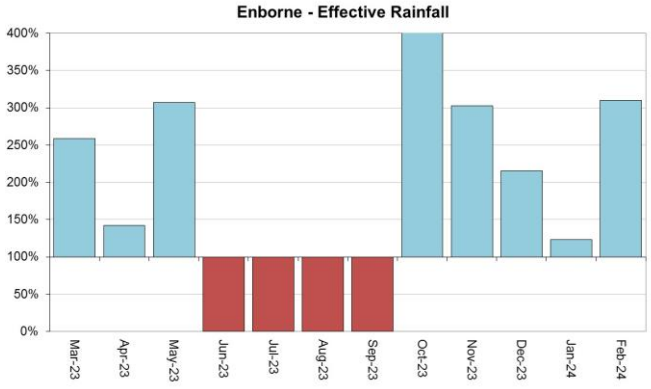
Enborne - Effective Rainfall
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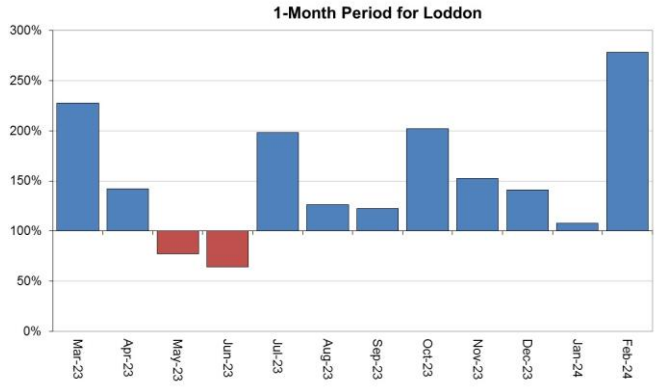
1-Month Period for Loddon
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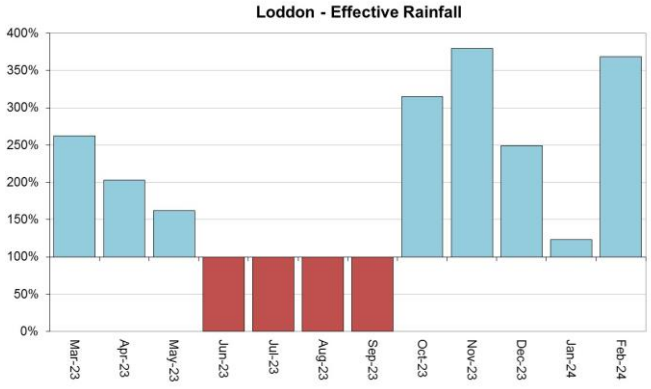
Loddon - Effective Rainfall
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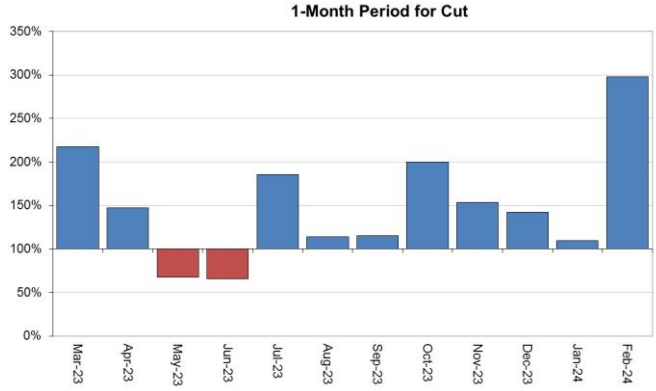
1-Month Period for Cut
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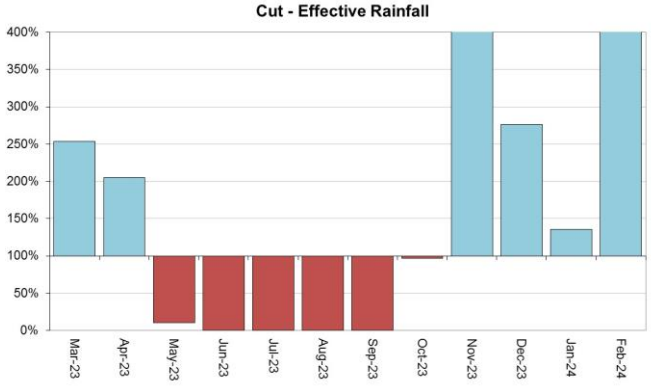
Cut - Effective Rainfall
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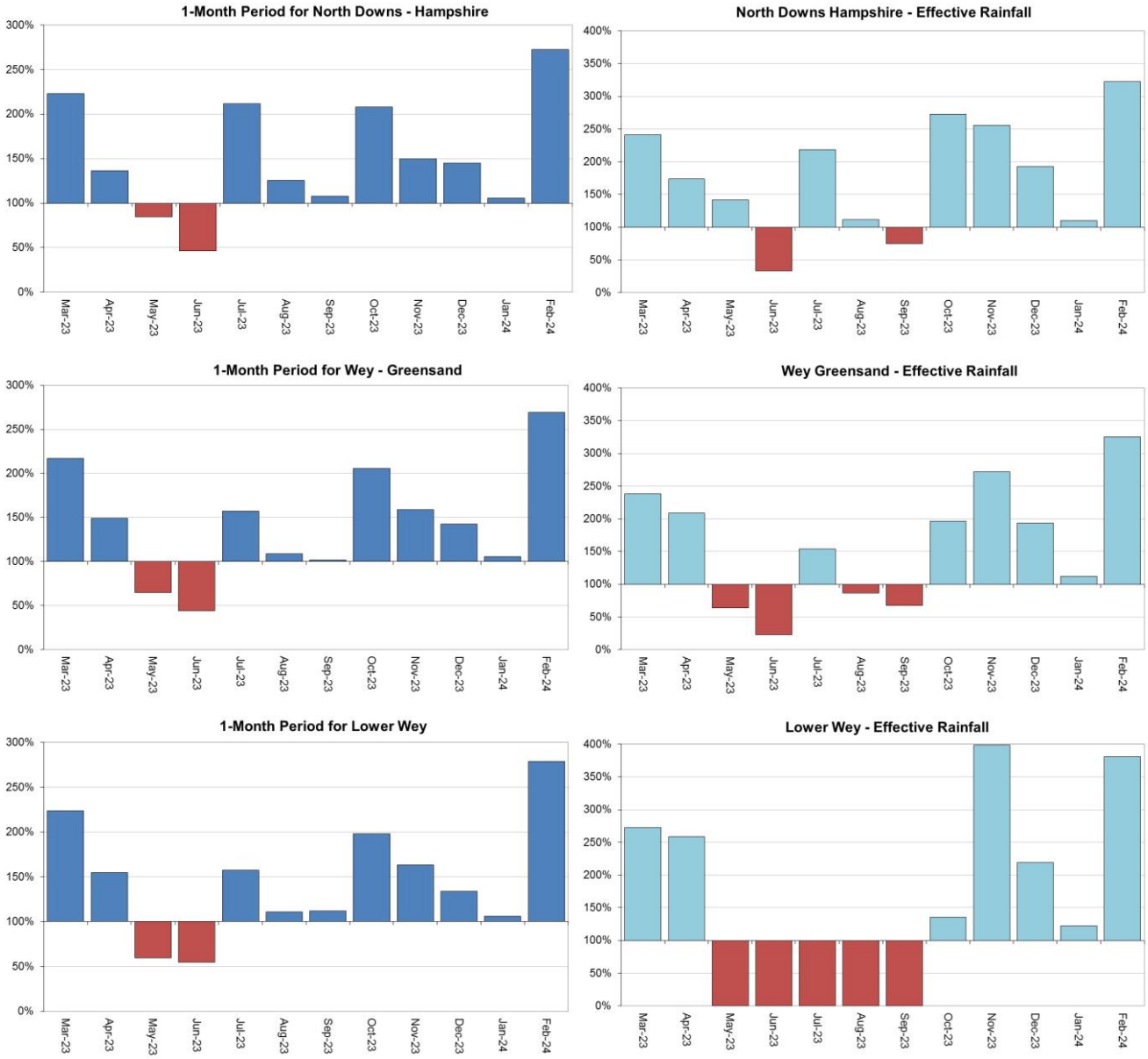


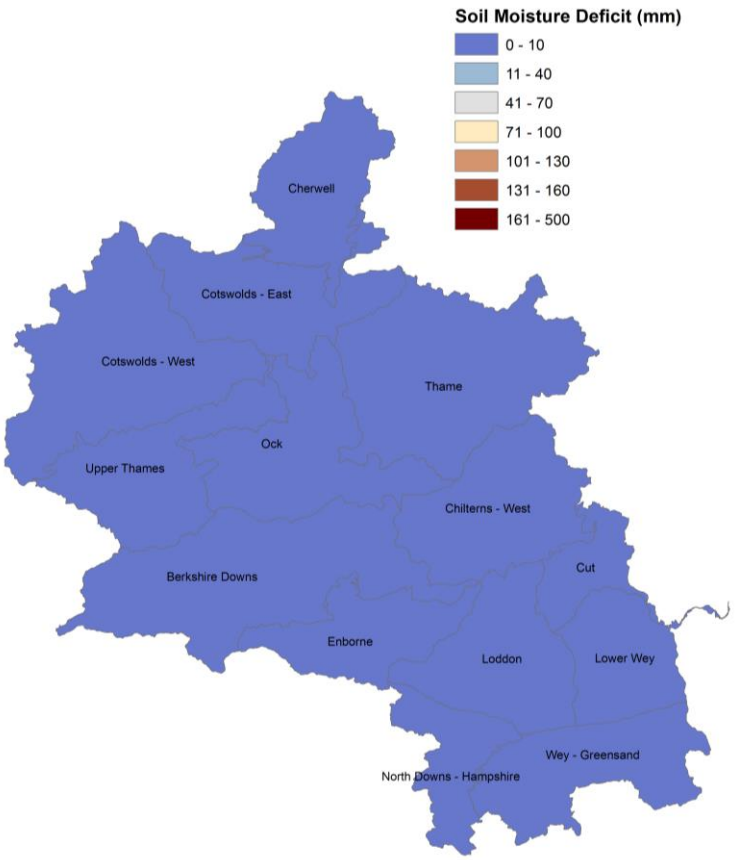
HadUK rainfall data. (Source: Met Office. Crown copyright, 2024).

EA effective rainfall data (Source: EA Soil Moisture Model)

3 Soil moisture deficit

3.1 Soil moisture deficit map

Figure 3.1: Soil moisture deficits for the week ending 29 February 2024. Shows the areal SMD estimate in millimetres.

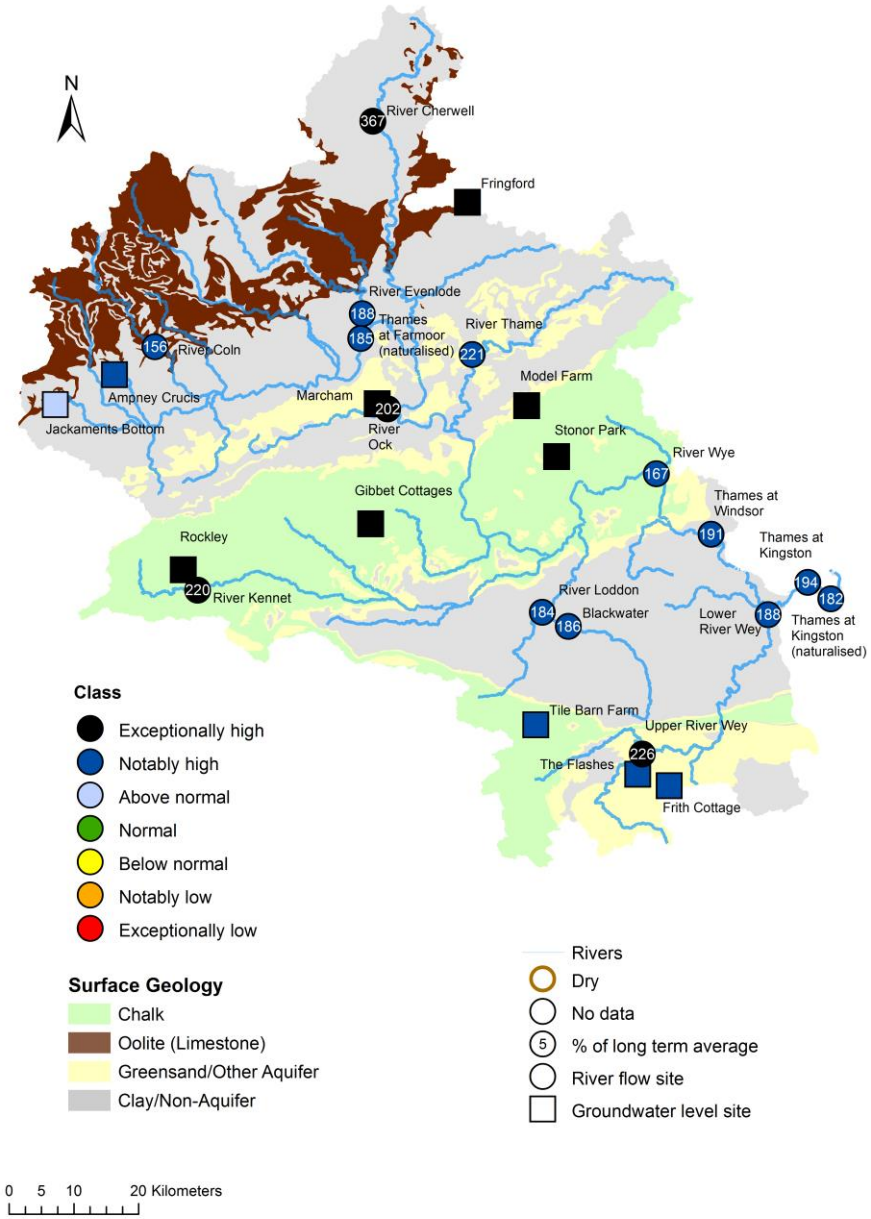


(Source: Met Office. Crown copyright, 2024). All rights reserved. Environment Agency, 100024198, 2024.

4 River Flow and Groundwater Status

4.1 River flow and groundwater level map

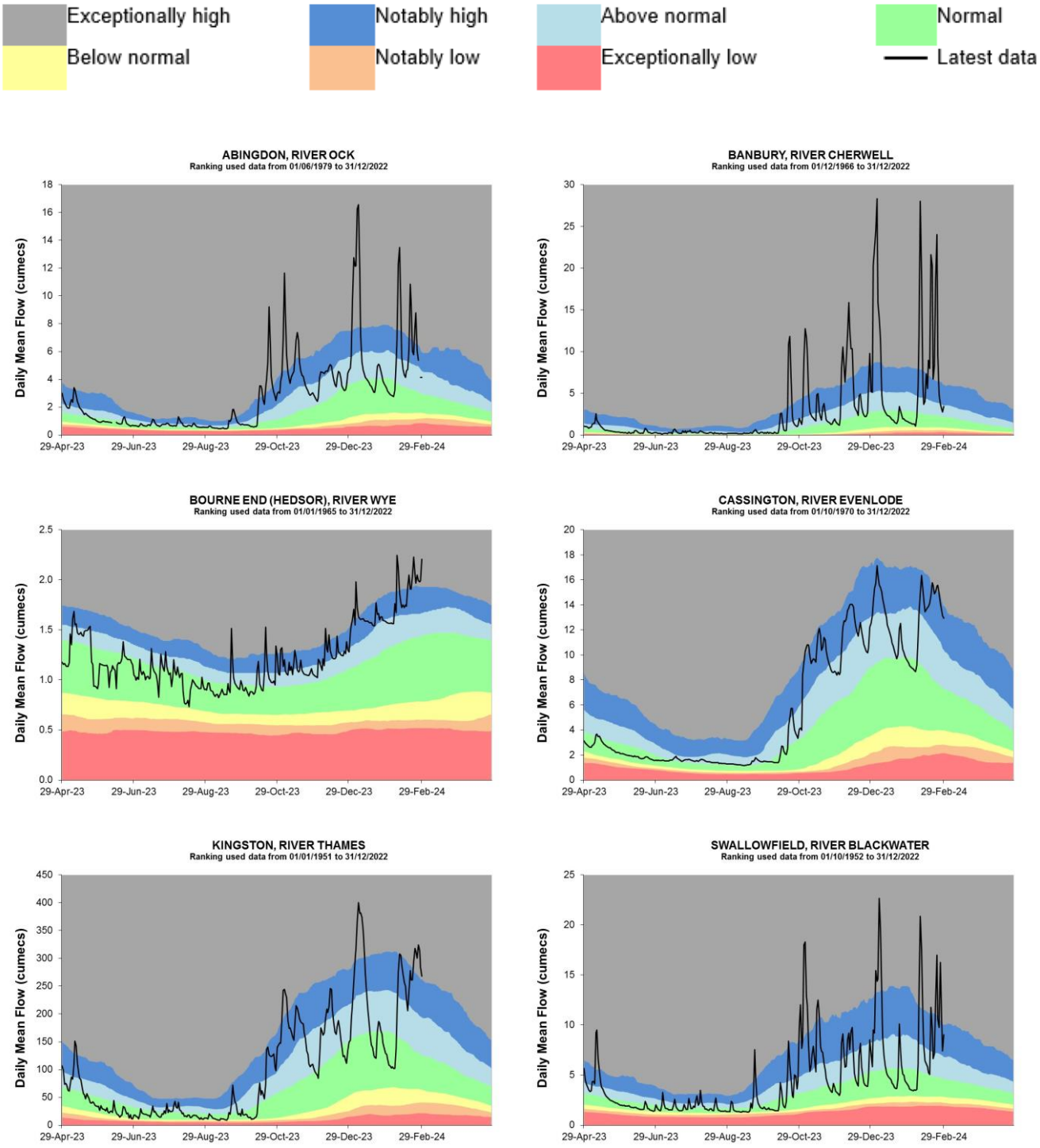
Figure 4.1: Monthly mean river flow for indicator sites and end of month groundwater levels for indicator sites for February 2024, expressed as a percentage of the respective long term average and classed relative to an analysis of historic February means.



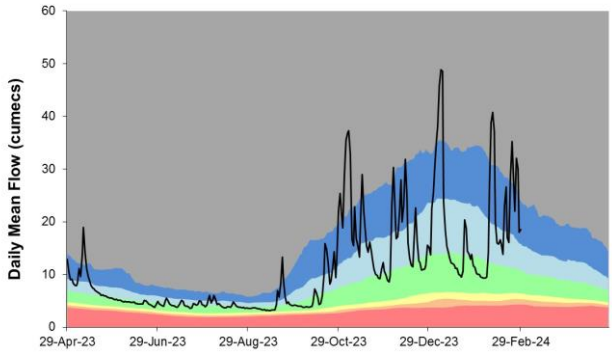
(Source: Environment Agency). Crown copyright. All rights reserved. Environment Agency, 100024198, 2024.

4.2 River flow charts

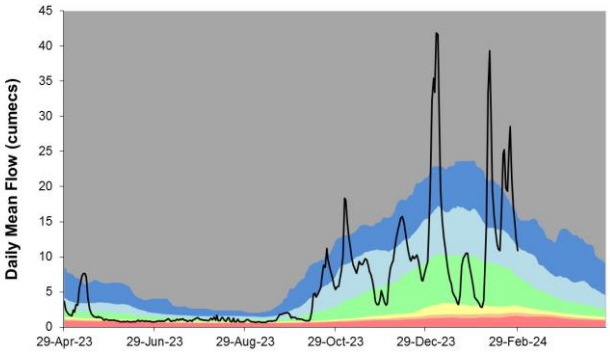
Figure 5.1: Daily mean river flows for indicator sites compared to an analysis of historic daily mean flows, and long term maximum and minimum flows.



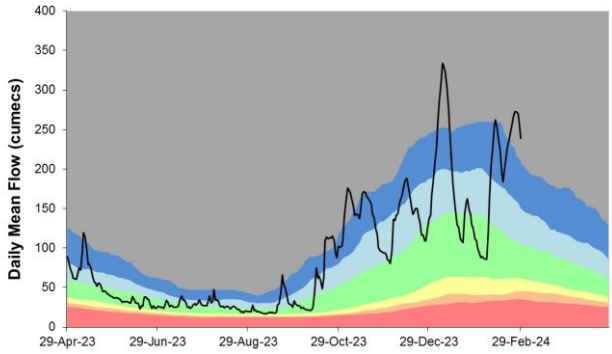
WEYBRIDGE, RIVER WEY
Ranking used data from 01/04/1979 to 31/12/2022



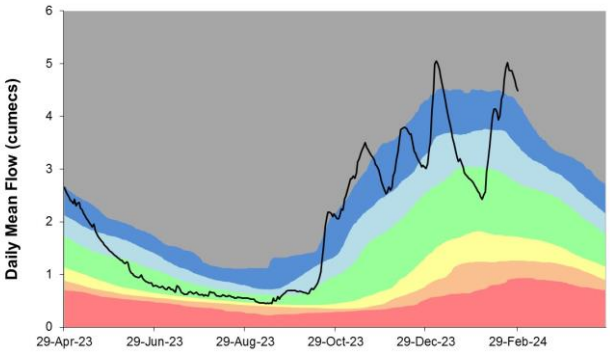
WHEATLEY, RIVER THAME
Ranking used data from 01/01/1990 to 31/12/2022



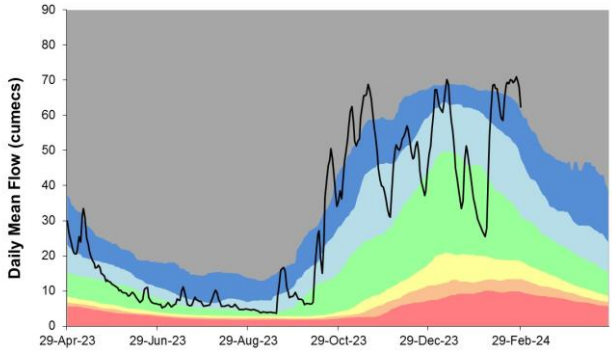
WINDSOR, RIVER THAMES
Ranking used data from 01/08/1979 to 31/12/2022



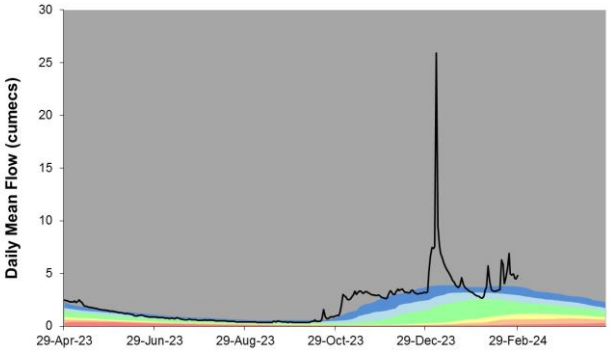
BIBURY, RIVER COLN
Ranking used data from 01/10/1963 to 31/12/2022

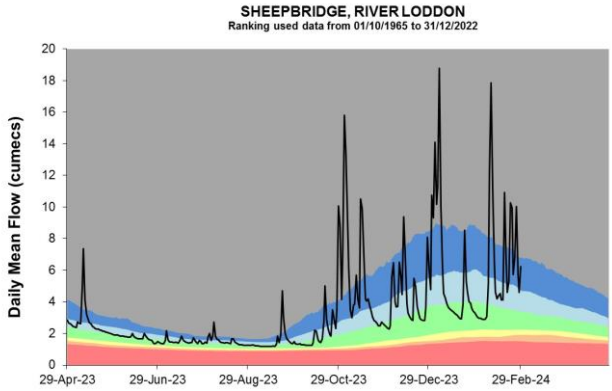


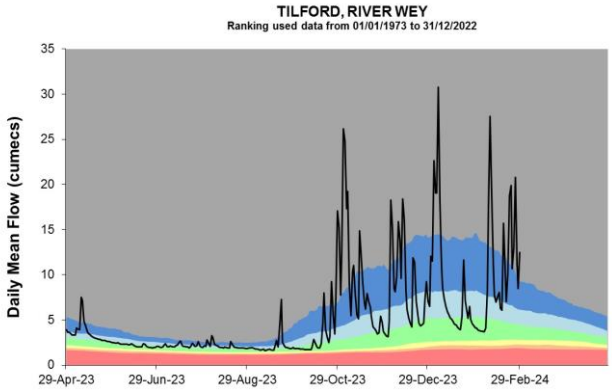
FARMOOR (NATURALISED), RIVER THAMES
Ranking used data from 01/10/1992 to 31/12/2022

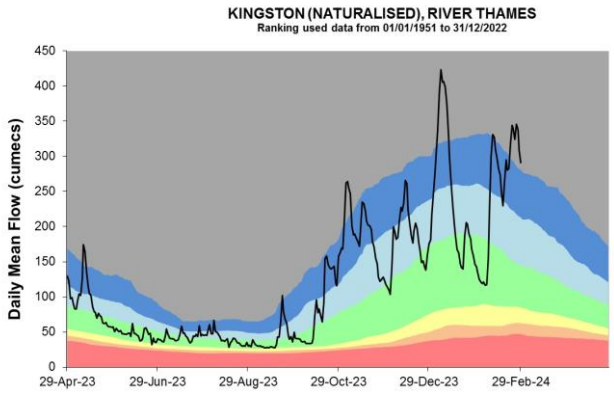


MARLBOROUGH, RIVER KENNET
Ranking used data from 01/02/1972 to 31/12/2022





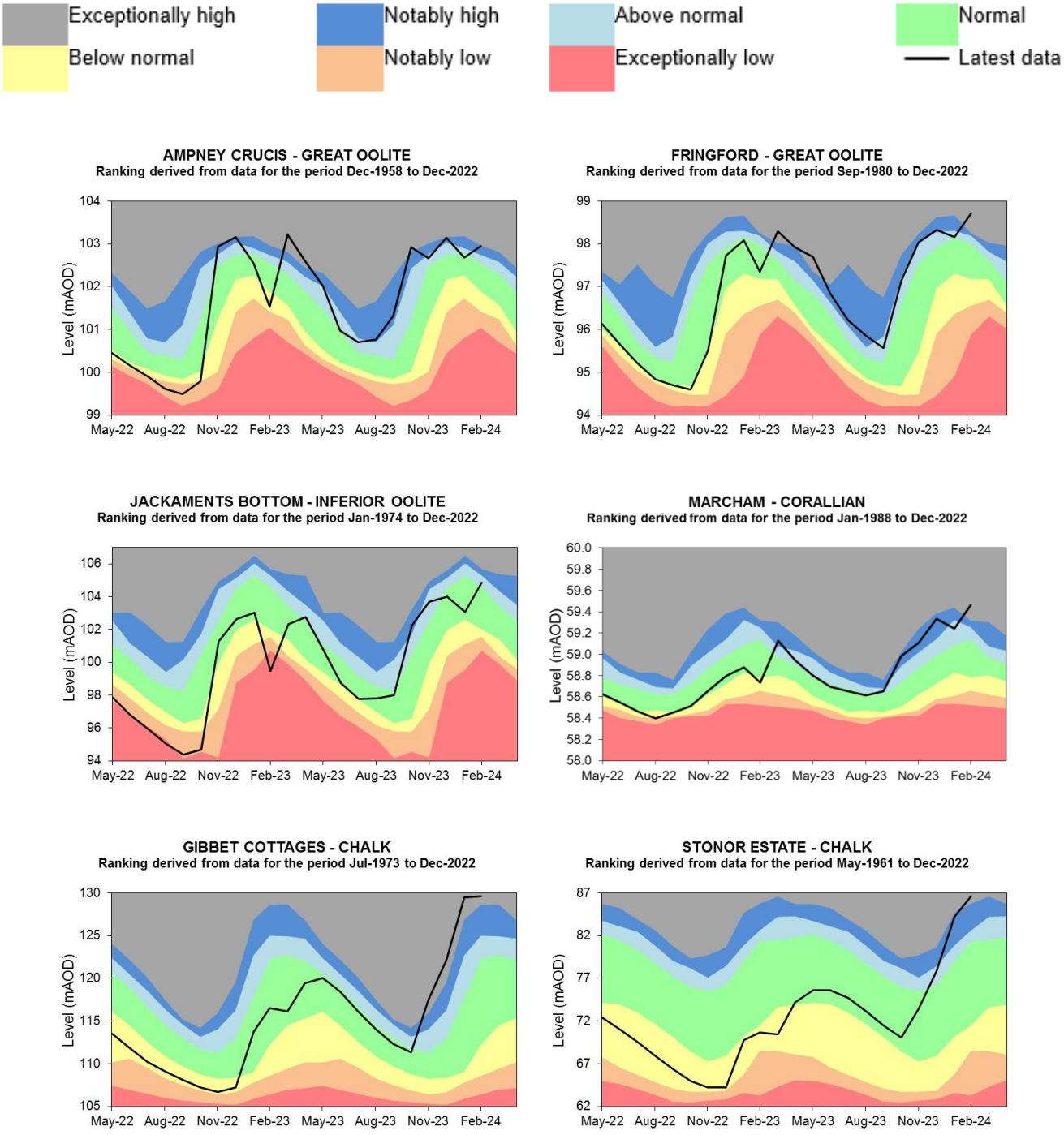


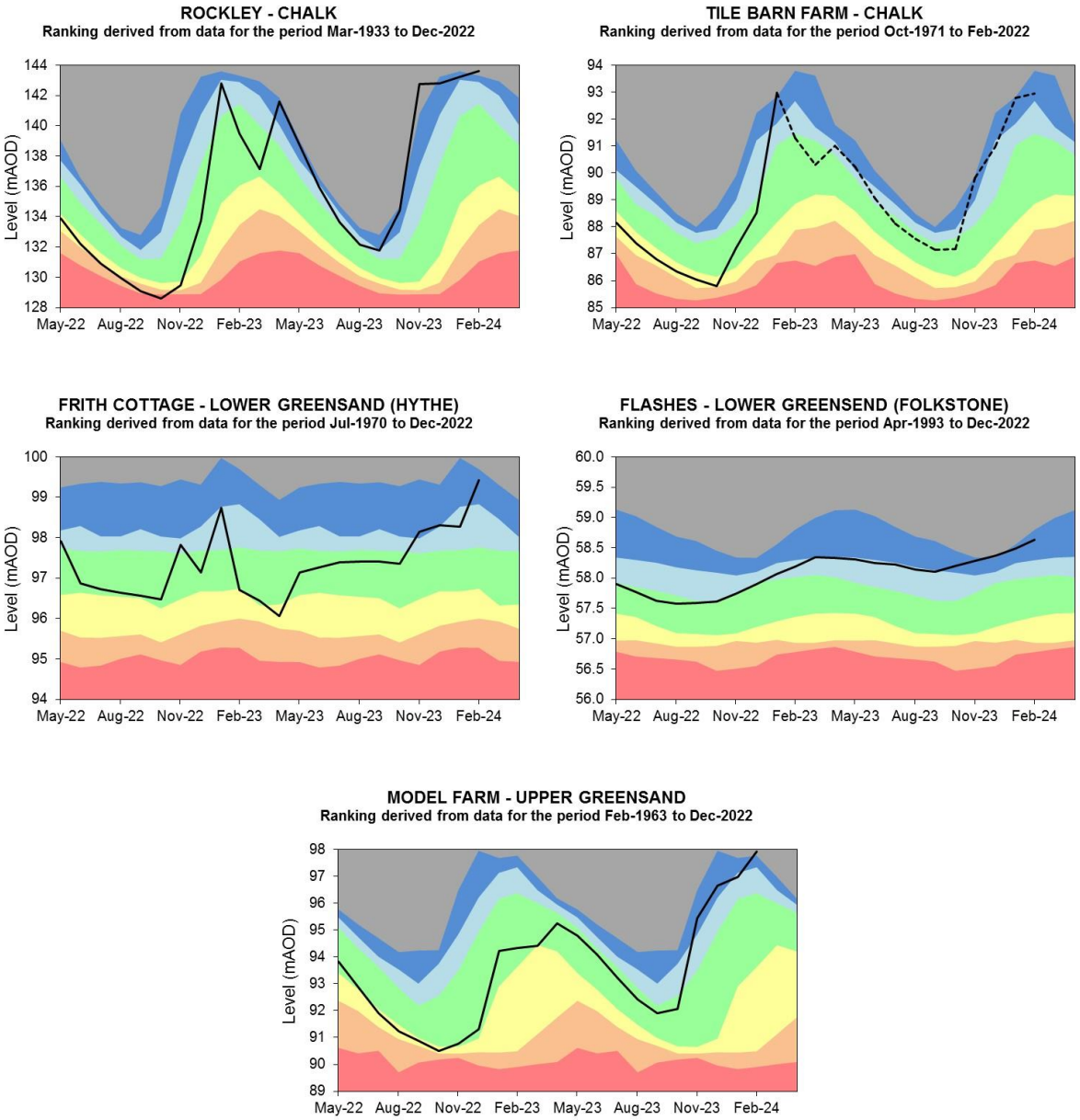


Source: Environment Agency.

4.3 Groundwater level charts

Figure 4.2: End of month groundwater levels for indicator sites, compared to an analysis of historic end of month levels, and long term maximum and minimum levels.



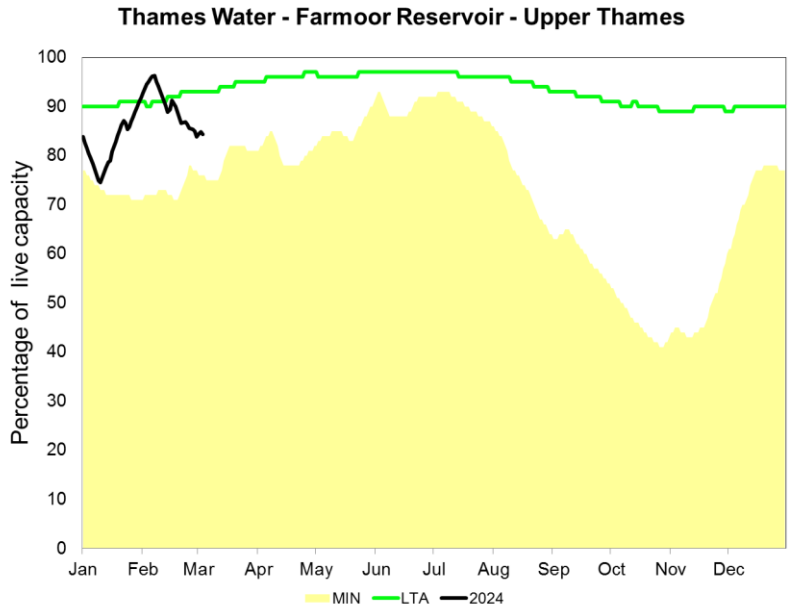


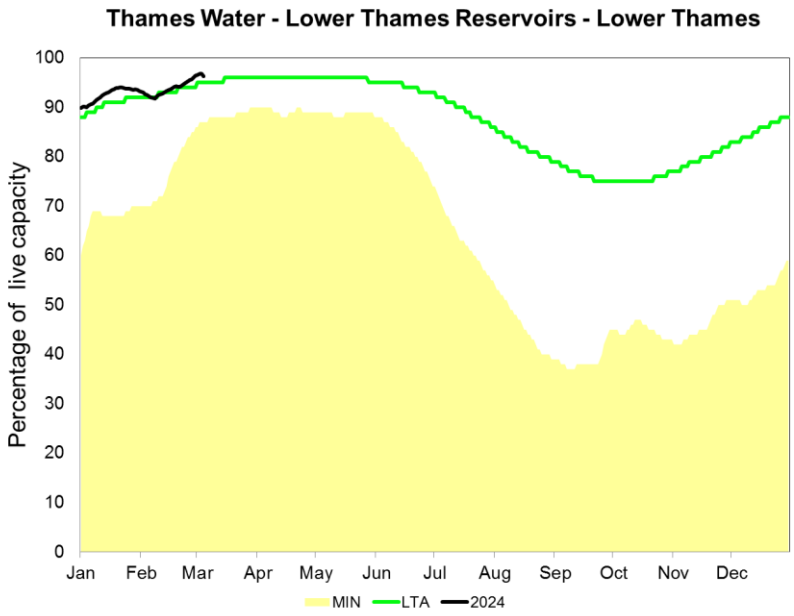
*Tile Barn Farm data has been estimated from two local sites since April 2022. A replacement is planned

Source: Environment Agency, 2024.

5 Reservoir stocks

Figure 5.1: End of month regional reservoir stocks compared to minimum and average stocks.

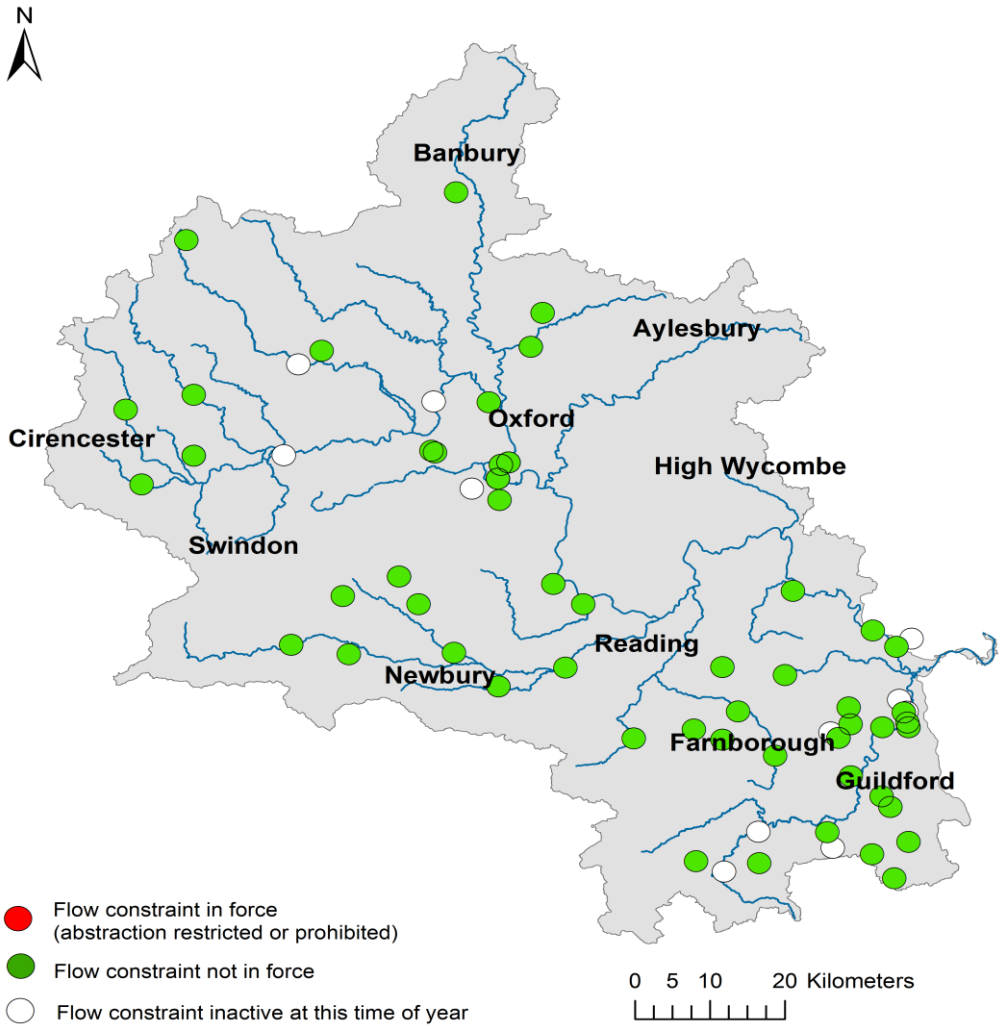




(Source: water companies).

6 Flow Constraints

6.1 Figure 6.1: End of month flow constraints in Thames Area.



6.2 Summary of flow constraints

Week ending	04/02/24	11/02/24	18/02/24	25/02/24
Number of flow constraints in force	2	0	0	0

7 Summary of rainfall, effective rainfall and soil moisture deficit

7.1 Rainfall and effective rainfall

Area	Rainfall (mm) 29 day Total	Rainfall (mm) February LTA	Rainfall (mm) % LTA	Effective Rainfall (mm) 29 day total	Effective Rainfall (mm) February LTA	Effective Rainfall (mm) % LTA
Cotswolds - West	158	57	276	136	42	327
Cotswolds - East	144	48	298	122	33	368
Berkshire Downs	145	52	277	122	37	332
Chilterns - West	130	47	274	108	31	345
North Downs - Hampshire	161	59	272	139	43	323
Wey - Greensand	150	56	268	128	39	325
Upper Thames	130	45	286	107	29	366
Cherwell	138	45	308	116	30	394
Thame	121	41	298	98	25	395
Loddon	123	44	277	99	27	369
Lower Wey	116	42	279	93	24	381
Ock	113	41	277	89	24	371
Enborne	131	51	257	108	35	310
Cut	118	40	297	94	21	438
Thames Area	**134**	**48**	**281**	**111**	**31**	**354**

HadUK rainfall data (Source: Met Office Crown copyright 2023)
EA effective rainfall data (Source: EA Soil Moisture Model)

7.2 Soil moisture deficit

Area	SMD (mm) Day 29	SMD (mm) LTA
Cotswolds - West	0	3
Cotswolds - East	0	4
Berkshire Downs	0	3
Chilterns - West	0	4
North Downs - Hampshire	0	3
Wey - Greensand	0	3
Upper Thames	0	5
Cherwell	0	4
Thame	0	5
Loddon	0	3
Lower Wey	0	4
Ock	0	7
Enborne	0	3
Cut	0	7
Thames Area	**0**	**4**

HadUK rainfall data (Source: Met Office Crown copyright 2023)
EA effective rainfall data (Source: EA Soil Moisture Model)

7.3 Winter rainfall and effective rainfall

Winter period: 01/10/2023 to 29/02/2024						
Area	Rainfall (mm) Total	Rainfall (mm) LTA	Rainfall (mm) % LTA	Effective Rainfall (mm) Total	Effective Rainfall (mm) LTA	Effective Rainfall (mm) % LTA
Cotswolds - West	625	359	174	519	231	225
Cotswolds - East	551	308	179	414	172	240
Berkshire Downs	639	348	184	504	189	267
Chilterns - West	537	321	167	374	160	233
North Downs - Hampshire	682	406	168	516	247	209
Wey - Greensand	659	391	169	481	234	206
Upper Thames	560	300	187	415	131	317
Cherwell	509	288	177	347	134	259
Thame	479	274	175	323	115	280
Loddon	519	309	168	352	139	253
Lower Wey	499	297	168	324	135	239
Ock	484	271	179	315	97	326
Enborne	571	342	167	433	182	238
Cut	486	283	172	304	109	279
Thames Area	**557**	**321**	**173**	**402**	**163**	**247**

HadUK rainfall data (Source: Met Office Crown copyright 2023)
EA effective rainfall data (Source: EA Soil Moisture Model)

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	Feb 2024 rainfall % of long term average 1961 to 1990	Feb 2024 band	Dec 2023 to February cumulative band	Sep 2023 to February cumulative band	Mar 2023 to February cumulative band
Berkshire Downs	276	Exceptionally High	Exceptionally high	Exceptionally high	Exceptionally high
Chilterns West	275	Exceptionally High	Exceptionally high	Exceptionally high	Exceptionally high
Cotswold East	298	Exceptionally High	Exceptionally high	Exceptionally high	Exceptionally high
Cotswold West	277	Exceptionally High	Exceptionally high	Exceptionally high	Exceptionally high
Cut	298	Exceptionally High	Exceptionally high	Exceptionally high	Exceptionally high
Enborne	261	Exceptionally High	Exceptionally high	Exceptionally high	Exceptionally high
Loddon	278	Exceptionally High	Notably high	Exceptionally high	Exceptionally high
Lower Wey	279	Exceptionally High	Notably high	Exceptionally high	Exceptionally high
North Downs - Hampshire	273	Exceptionally High	Notably high	Exceptionally high	Exceptionally high
Ock	276	Exceptionally High	Exceptionally high	Exceptionally high	Exceptionally high

Thame	298	Exceptionally High	Exceptionally high	Exceptionally high	Exceptionally high
Upper Cherwell	309	Exceptionally High	Exceptionally high	Exceptionally high	Exceptionally high
Upper Thames	285	Exceptionally High	Exceptionally high	Exceptionally high	Exceptionally high
Wey - Greensand	269	Exceptionally High	Notably high	Exceptionally high	Exceptionally high

9.2 River flows table

Site name	River	Catchment	Feb 2024 band	Jan 2024 band
Abingdon	River Ock	Ock	Exceptionally high	Exceptionally high
Banbury	River Cherwell	Cherwell Upper	Exceptionally high	Exceptionally high
Bibury	River Coln	Cotswolds West	Notably high	Above normal
Bourne End (Hedsor)	River Wye	Wye Bucks	Notably high	Notably high
Cassington	River Evenlode	Evenlode	Notably high	Notably high
Farmoor (naturalised)	River Thames	Thames	Notably high	Above normal
Kingston	River Thames	Thames North Bank	Notably high	Notably high
Kingston (naturalised)	River Thames	Thames North Bank	Notably high	Exceptionally high
Marlborough	River Kennet	Kennet	Exceptionally high	Exceptionally high
Sheepbridge	River Loddon	Loddon	Notably high	Notably high
Swallowfield	River Blackwater	Loddon	Notably high	Notably high
Tilford	River Wey	Wey Addlestone Bourne	Exceptionally high	Exceptionally high

Weybridge	River Wey	Wey Addlestone Bourne	Notably high	Notably high
Wheatley	River Thame	Thame	Notably high	Above normal
Windsor	River Thames	Thames	Notably high	Notably high

9.3 Groundwater table

Site name	Aquifer	End of Feb 2024 band	End of Jan 2024 band
Ampney Crucis OBH	Burford Oolitic Limestone (great)	Notably high	Normal
Frith Cottage	Godalming Lower Greensand	Notably high	Above normal
Gibbet Cottages OBH	Berkshire Downs Chalk	Exceptionally high	Exceptionally high
Jackaments Bottom OBH	Burford Oolitic Limestone (inferior)	Above normal	Normal
Marcham OBH	Shrivenham Corallian	Exceptionally high	Above normal
Model Farm	Chiltern Upper Greensand	Exceptionally high	Above normal
Rockley OBH	Berkshire Downs Chalk	Exceptionally high	Notably high
Stonor Estate	South-west Chilterns Chalk	Exceptionally high	Notably high
The Flashes OBH	Godalming Lower Greensand	Notably high	Notably high
Tile Barn Farm	Basingstoke Chalk	Notably high	Notably high
Fringford P.S.	Upper Bedford Ouse Oolitic Limestone (great)	Exceptionally high	Normal