Monthly water situation report:

South-east England

1 Summary - February 2024

High rainfall totals occurred throughout February across the whole of the south east of England with 289% of the long term average (LTA) rainfall being recorded during the month. By the twelfth just over a month's rainfall had already been logged. Soil moisture deficits were reduced below the LTA, on average across the south east of England by the twelfth of February after the first heavy rainfall was recorded. Recharge was therefore occurring for much of the month across most of the south east of England. River flows at all of the key indicator sites were notably high or higher during February, with just one exception at Hawley on the River Darent Kent and South London (KSL) that recorded a monthly mean flow of above normal. There were a total of 209 fluvial flood alerts issued during February, 43 flood warnings and 20 groundwater flood alerts issued and updated during the month. Groundwater levels have risen at all of the key indicator sites, with only 1 exception at Lopcombe Corner, Solent and South Downs (SSD) that has levelled off during the month. Two thirds of the sites were notably high or exceptionally high, with Wolverton (KSL) groundwater level at its highest February level since records began in 1971.

1.1 Rainfall

High rainfall totals occurred throughout February across the whole of the south east of England with 289% of the LTA rainfall being recorded during the month. By the twelfth just over a month's rainfall had already been logged and by the last week over 2 times the monthly rainfall had been recorded. In particular, bands of heavy rain moved west to east from February 22 causing extensive flooding in parts of the south east for the second time in 2024. The highest daily total was 43.8mm recorded on twenty fifth at Hastings Baldslow raingauge (SSD). Thames (THM) and SSD both recorded their wettest February on record. In addition, the south east of England and Hertfordshire and North London (HNL) were both the second wettest February on record since 1951. Over half the areal units were the wettest or second wettest on record. Many units exceeded the totals set in 1951 or even earlier such as the Upper Thames (THM), which was higher than the 1937 total and the Berkshire Downs (THM) where February 2024 was higher than 1915. Those units that were second wettest were generally second wettest since 1951 or 2014.

1.2 Soil moisture deficit and recharge

Soil moisture deficits were reduced below the LTA, on average across the south east of England by the twelfth of February after the first heavy rainfall was recorded. They were then

eliminated in every areal unit by the end of the month after further bands of persistent and heavy rainfall crossed the south east. Recharge was therefore occurring for much of the month across most of the south east of England. Recharge in some areal units was higher than 400% of the LTA and for the winter so far (October to February) recharge averaged 236% of the LTA across the south east.

1.3 River flows

River flows at all of the key indicator sites were notably high or higher during February, with just one exception at Hawley on the River Darent (KSL) that recorded a monthly mean flow of above normal. There were several responses by the flows to the pulses of rainfall that crossed the south east of England. These peaks were generally on an upward trend throughout the month at most sites. Many sites recorded high flows, including the Wey at Tilford and the Thames at Farmoor (both THM) both reaching the third highest flows since 2020 and 1995 respectively. The Kennet at Marlborough (THM) and the Lymington River at Brockenhurst (SSD) both reached the second highest flows on record since 2014. There were a total of 209 fluvial flood alerts issued during February, 43 flood warnings and 20 groundwater flood alerts issued and updated during the month.

	HNL	THM	SSD	KSL	Total
Fluvial Alerts	32	70	49	58	209
Fluvial Warnings	0	20	17	6	43
GW alerts	2	2	14	2	20
Total	34	92	80	66	272

1.4 Groundwater levels

Groundwater levels have risen at all of the key indicator sites, with only 1 exception at Lopcombe Corner (SSD) that has levelled off during the month. This reflects the very high rainfall and recharge during February. Two thirds of the sites were notably high or exceptionally high, with a few sites being the third highest level on record, including at Gibbet Cottages (THM) and West Meon (SSD). Chilgrove and Carisbrooke (both SSD), ended the month at the second highest level on record since 1915 and 2010 respectively. Wolverton (KSL) groundwater level was at its highest February level since records began in 1971.
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1.5 Reservoir stocks

Reservoir stocks ended February below the LTA at Farmoor (THM), Lee Valley (HNL) and Arlington (SSD) reservoirs and above the LTA at Lower Thames (THM), Ardingly (SSD), Bough Beech, Darwell, Bewl, Powdermill & Weir Wood (all KSL) reservoirs.

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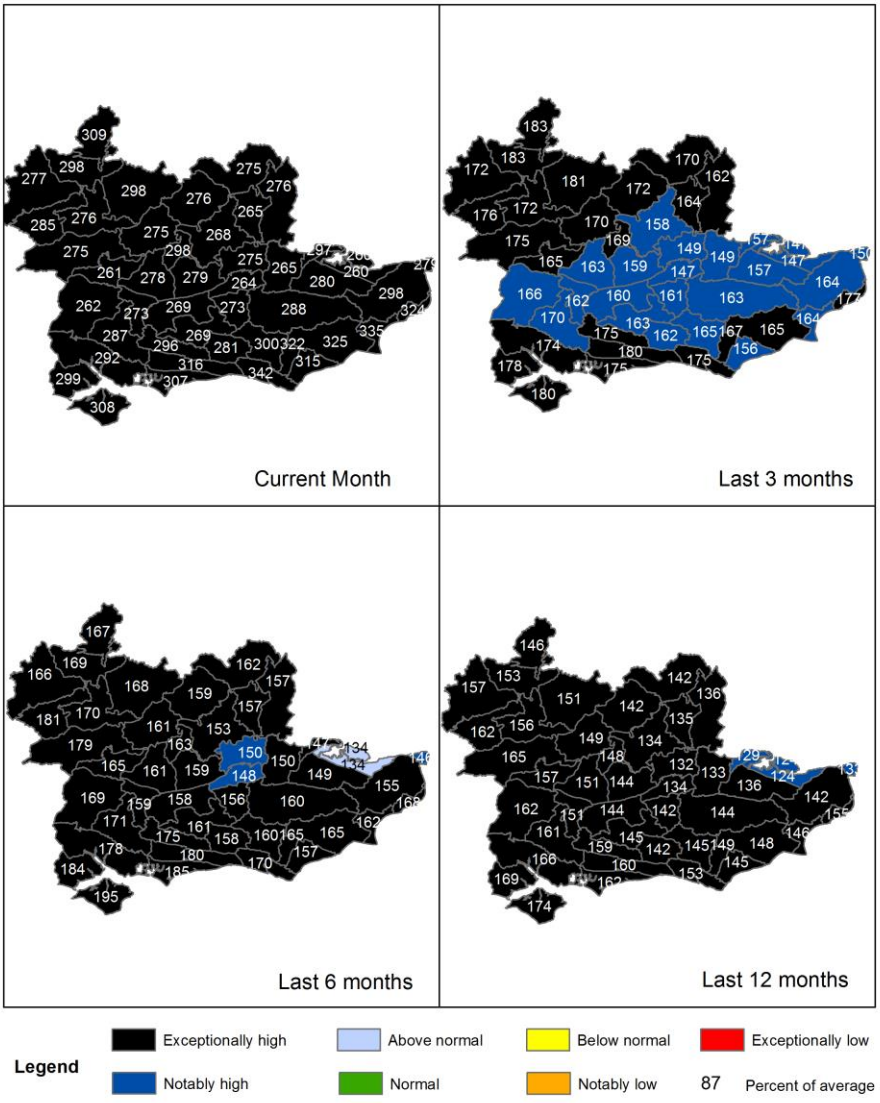
2 Maps

2.1 Rainfall map

Figure 2.1: 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.

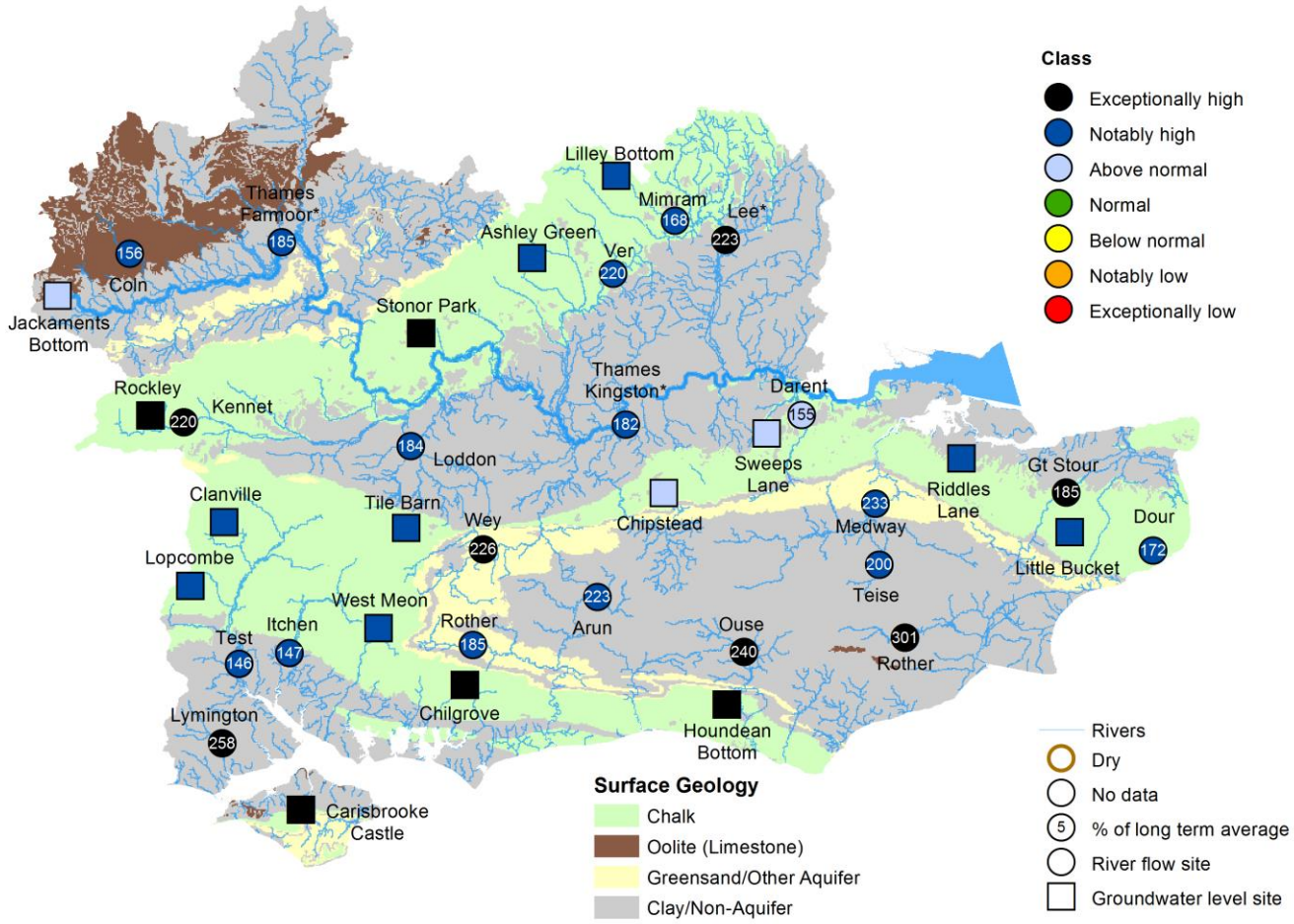


Rainfall data for 2024, extracted from Environment Agency 1km gridded rainfall dataset derived from Environment Agency intensity rain gauges. (Source: Environment Agency. Crown Copyright, 100024198, 2024). Rainfall data prior to 2024, extracted from Met Office HadUK 1km gridded rainfall dataset derived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

2.2 River flows and groundwater levels map

Figure 2.2: Monthly mean river flow 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 monthly means Table available in the appendices with detailed information. Groundwater levels for indicator sites at the end of February 2024, classed relative to an analysis of respective historic February levels. Table available in the appendices with detailed information.

Flows at gauging stations in the Medway catchment (KSL) might be affected by upstream reservoir releases.



3 Rainfall, effective rainfall and soil moisture deficit tables

3.1 Rainfall, effective rainfall and soil moisture deficit table

Figure 3.1: This is a second estimate of areal rainfall, effective rainfall (percolation or runoff) and SMDs for a selection of the hydrological areas across the South-east of England. There may be significant variation within each area which must be considered when interpreting these data. When additional meteorological data is available estimates are revised which will affect the period totals in Figure 3.2.

Number	Hydrological Area	Rainfall (mm) 29 day Total	February % LTA	Effective Rainfall (mm) 29 day total	February % LTA	SMD (mm) Day 29	End Feb LTA
6010TH	Cotswolds - West (A)	158	276%	136	327%	0	3
6070TH	Berkshire Downs (G)	145	277%	122	332%	0	3
6130TH	Chilterns - West (M)	130	274%	108	345%	0	4
6162TH	North Downs - Hampshire (P)	161	272%	139	323%	0	3
6190TH	Wey - Greensand (S)	150	268%	128	325%	0	3
	Thames Average	134	281%	111	354%	0	4
	Thames Catchment Average	134	279%	112	351%	0	4
6140TH	Chilterns - East - Colne (N)	132	275%	110	348%	0	4
6600TH	Lee Chalk	113	275%	90	399%	0	9
6507TH	North London	104	268%	79	-	0	6
6509TH	Roding	102	276%	79	-	0	7
	Herts and North London	111	272%	88	385%	0	6
6230TH	North Downs - South London (W)	132	263%	110	325%	0	3
6706So	Darent	116	265%	93	357%	0	4

6707So	North Kent Chalk	129	280%	106	374%	0	4
6708So	Stour	138	297%	115	-	0	3
6809So	Medway	145	288%	123	363%	0	2
	Kent & South London Average	129	290%	106	-	0	8
6701So	Test Chalk	152	262%	130	307%	0	3
6702So	East Hampshire Chalk	180	287%	158	336%	0	2
6703So	West Sussex Chalk	197	315%	176	373%	0	2
6804So	Arun	149	270%	126	328%	0	2
6805So	Adur	154	280%	133	339%	0	2
	Solent & South Downs Average	174	300%	152	363%	0	3
	South East Average	142	289%	119	372%	0	5

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

EA effective rainfall and soil moisture deficit data (Source EA Soil Moisture Model 2024.)

3.2 Seasonal summary table of rainfall and effective rainfall

Figure 3.2 This is a seasonal estimate of areal rainfall and effective rainfall (percolation or runoff) for a selection of the hydrological areas across the South-east of England, expressed as totals and as a percentage of the LTA. There may be significant variation within each area which must be considered when interpreting these data. When additional meteorological data is available estimates are revised which will affect the period totals.

Winter period 01/10/2023 to 29/02/2024

Number	Hydrological Area	Seasonal Rainfall (mm) Total	Seasonal Rainfall as % LTA	Seasonal Effective Rainfall (mm) Total	Seasonal Effective Rainfall as % LTA
6010TH	Cotswolds - West (A)	625	174%	519	225%
6070TH	Berkshire Downs (G)	639	184%	504	267%
6130TH	Chilterns - West (M)	537	167%	374	233%
6162TH	North Downs - Hampshire (P)	682	168%	516	209%
6190TH	Wey - Greensand (S)	659	169%	481	206%
	Thames Average	557	173%	402	247%
	Thames Catchment Average	561	172%	401	238%
6140TH	Chilterns - East - Colne (N)	539	167%	367	228%
6600TH	Lee Chalk	458	167%	280	278%
6507TH	North London	455	162%	260	253%
6509TH	Roding	431	167%	241	271%
	Herts and North London	467	165%	283	253%
6230TH	North Downs - South London (W)	563	158%	378	188%

6706So	Darent	509	166%	299	208%
6707So	North Kent Chalk	540	165%	333	202%
6708So	Stour	607	175%	399	229%
6809So	Medway	636	175%	450	206%
	Kent & South London Average	560	172%	352	225%
6701So	Test Chalk	674	174%	535	236%
6702So	East Hampshire Chalk	780	182%	624	224%
6703So	West Sussex Chalk	862	196%	695	235%
6804So	Arun	685	175%	511	209%
6805So	Adur	685	171%	509	197%
	Solent & South Downs Average	760	186%	593	233%
	South East Average	610	177%	433	236%

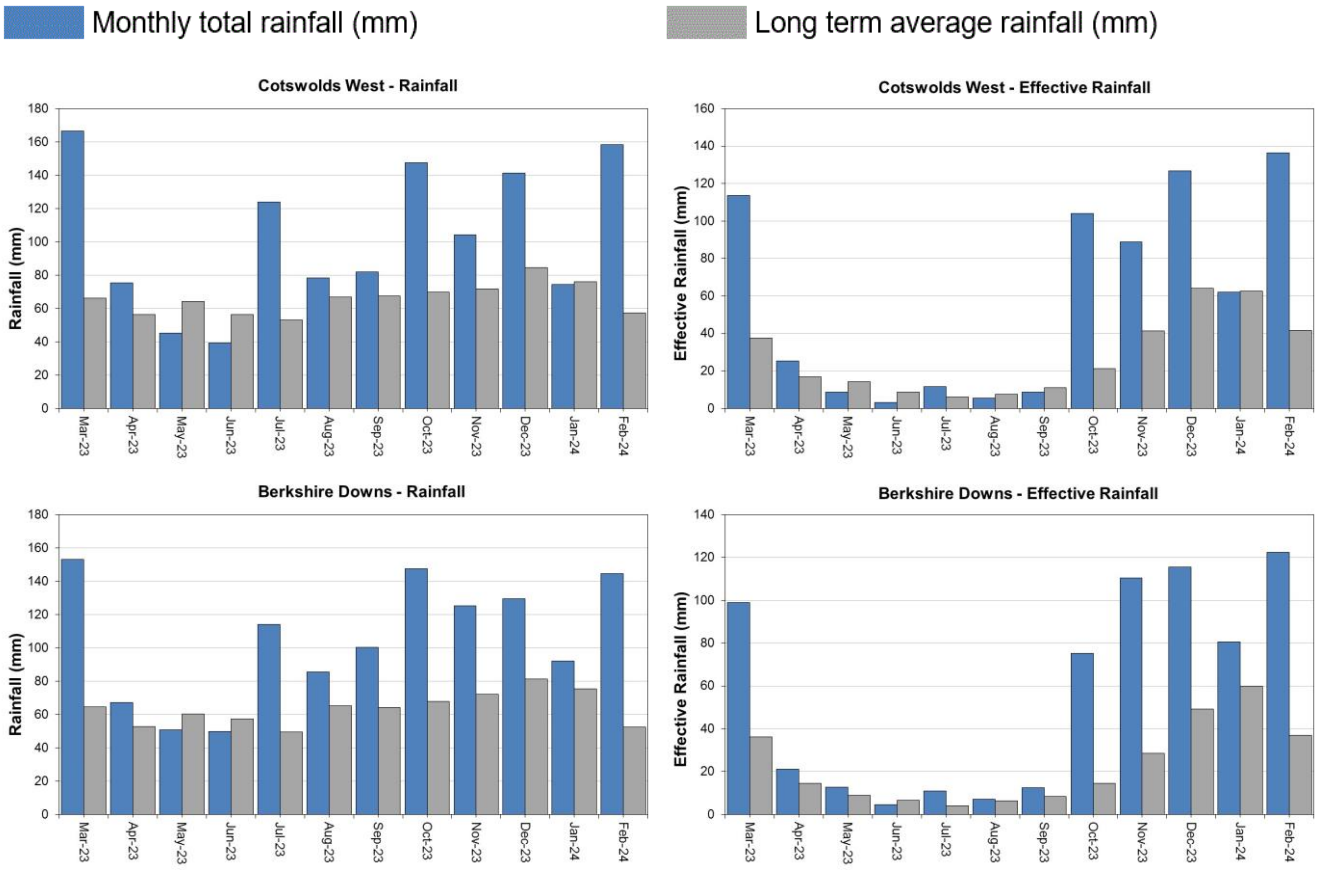
HadUK rainfall data. (Source: Met Office. Crown copyright, 2024).

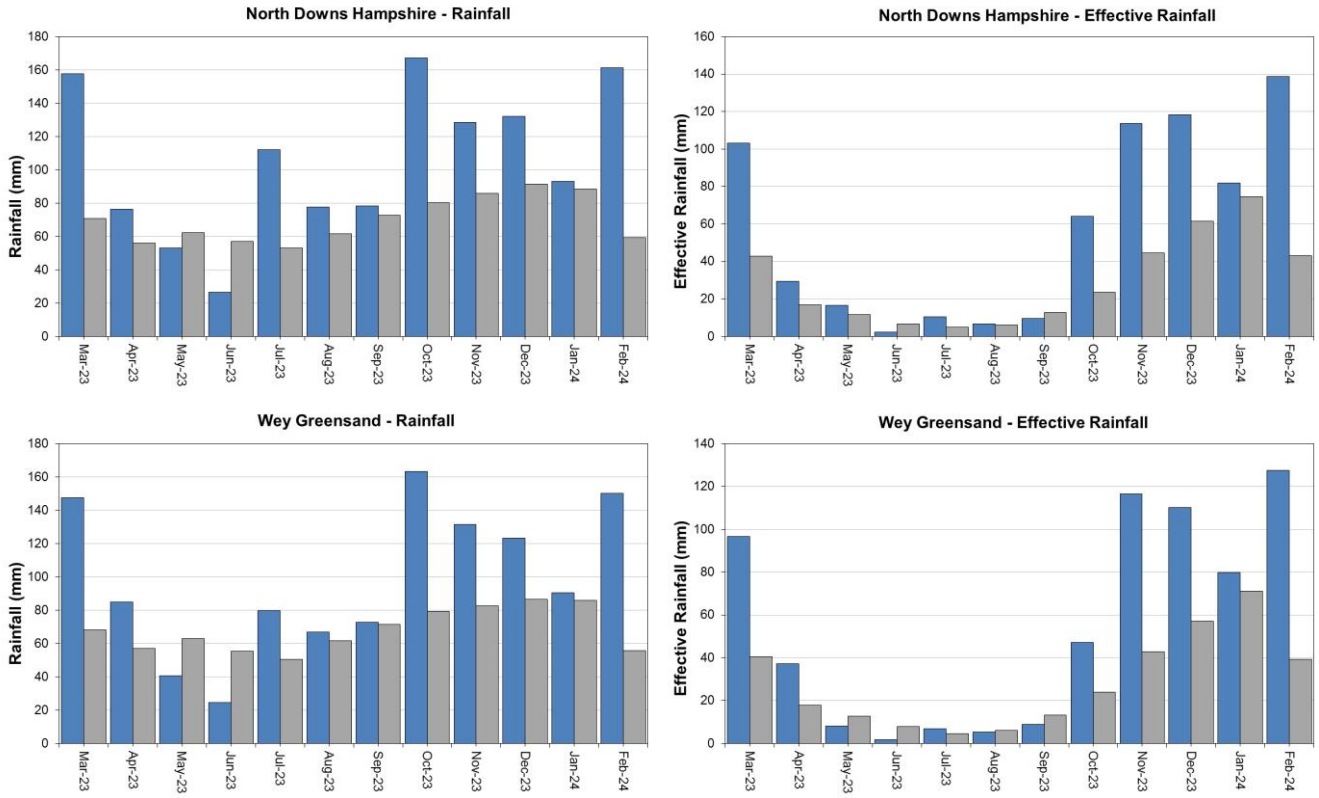
EA effective rainfall data (Source EA Soil Moisture Model 2024.)

4 Thames

4.1 Thames 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 a selection of areal units.





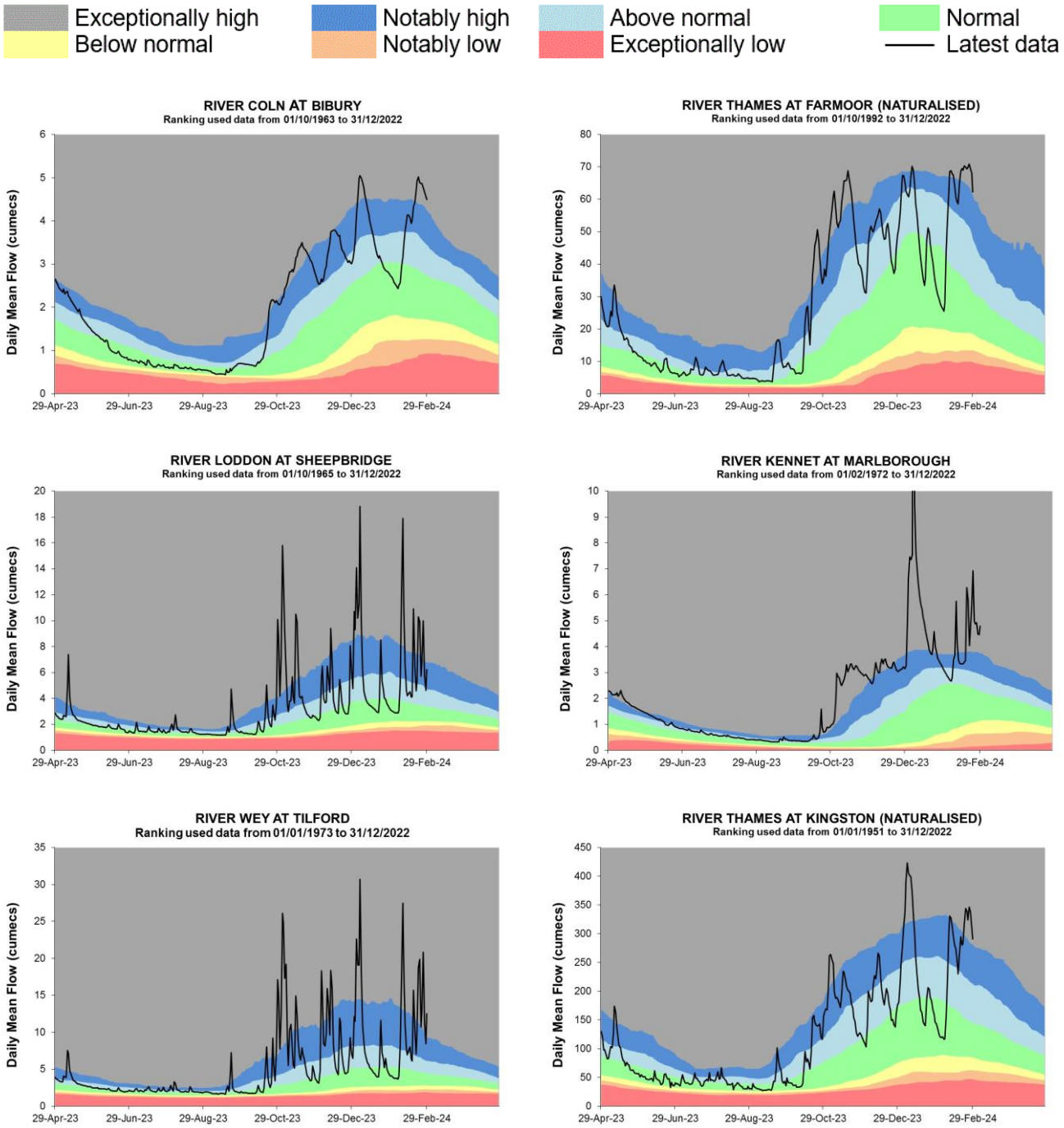
HadUK rainfall data. (Source: Met Office. Crown copyright, 2024).

EA effective rainfall data (Source EA Soil Moisture Model, 2024).

4.2 Thames 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.

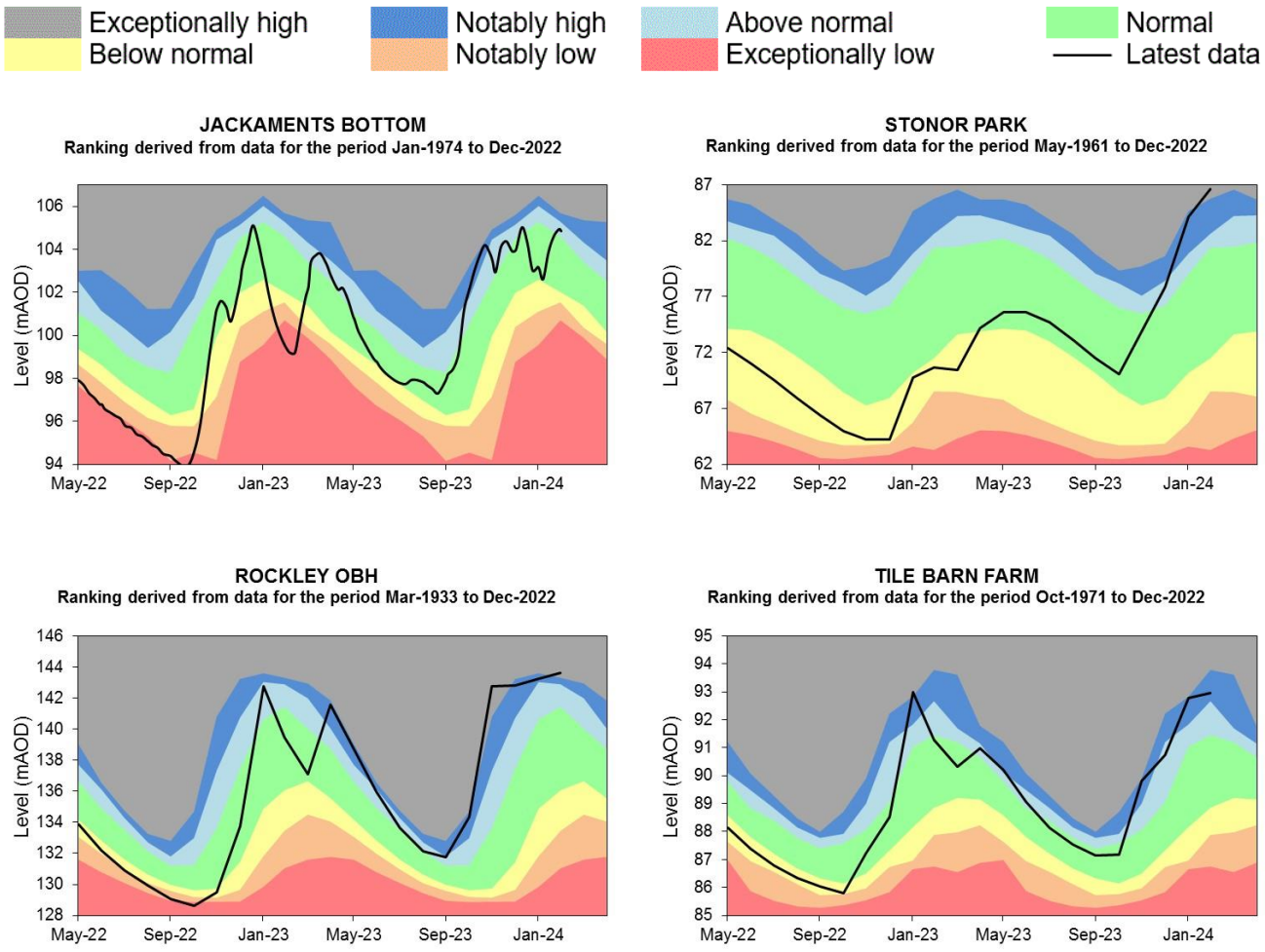
Please note that the peak at Marlborough in January 2024 is thought to be overestimated. It is being checked.



Source: Environment Agency. 2024

4.3 Thames Groundwater level charts

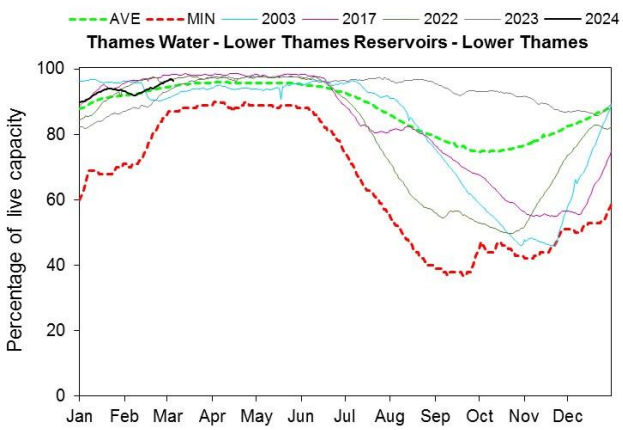
Figure 4.3: End of month groundwater levels at index groundwater level sites for major aquifers. 22 months compared to an analysis of historic end of month levels and long term maximum and minimum levels. Tile Barn Farm data has been estimated from 2 local sites since April 2022. A replacement is planned.

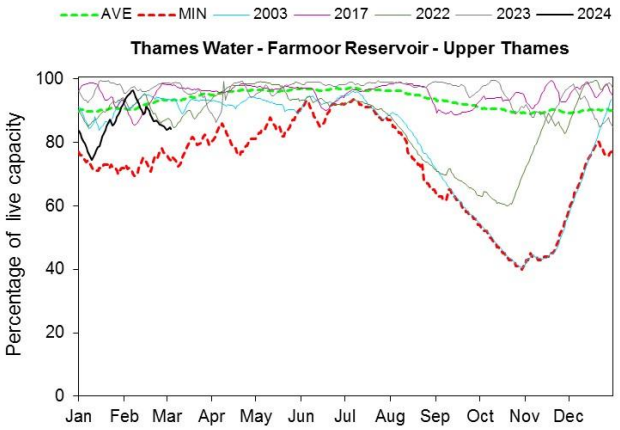


Source: Environment Agency, 2024.

4.4 Thames Reservoir stocks

Figure 4.4: End of month regional reservoir stocks 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.



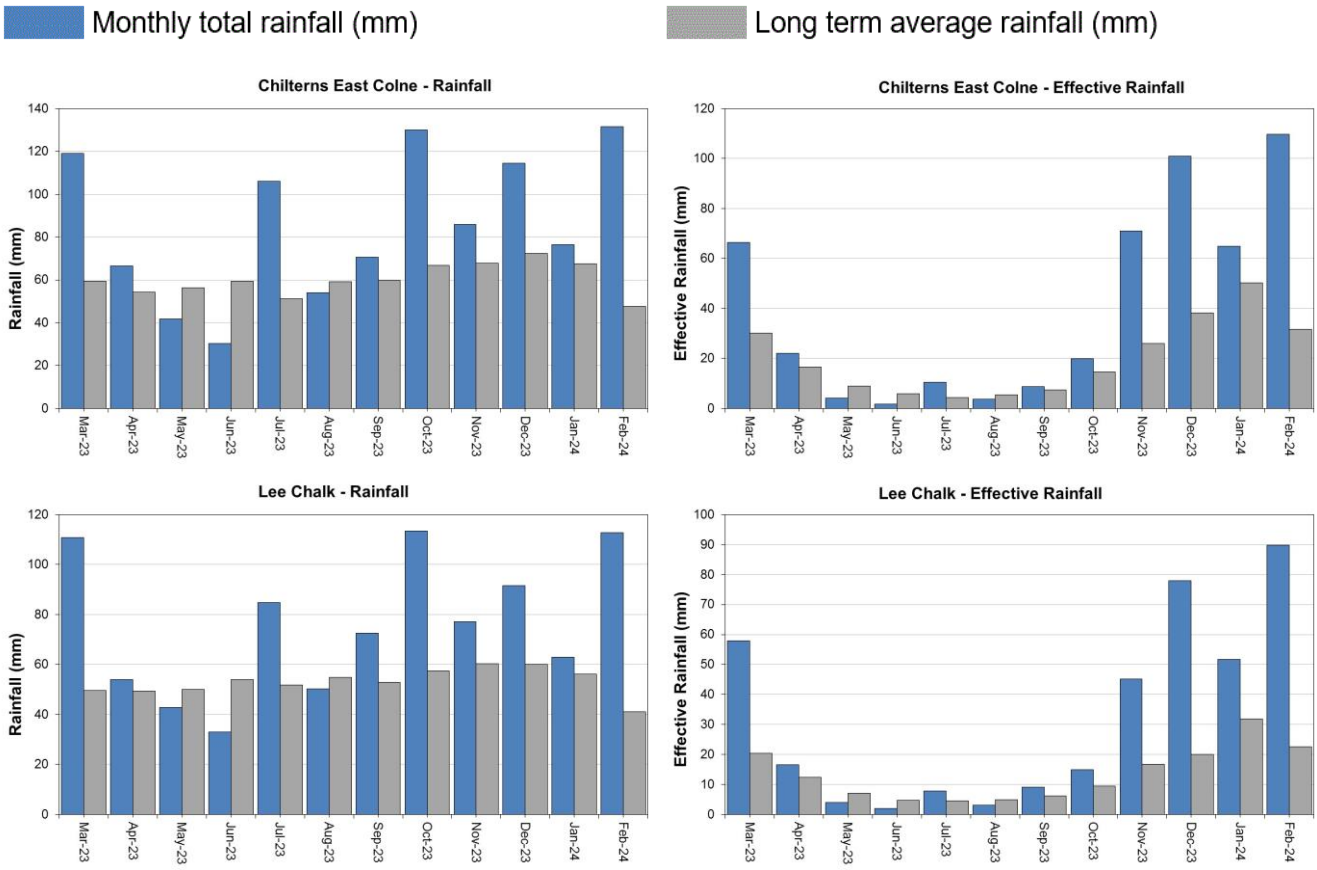


(Source: water companies).

5 Hertfordshire and North London (HNL)

5.1 HNL 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 a selection of areal units.

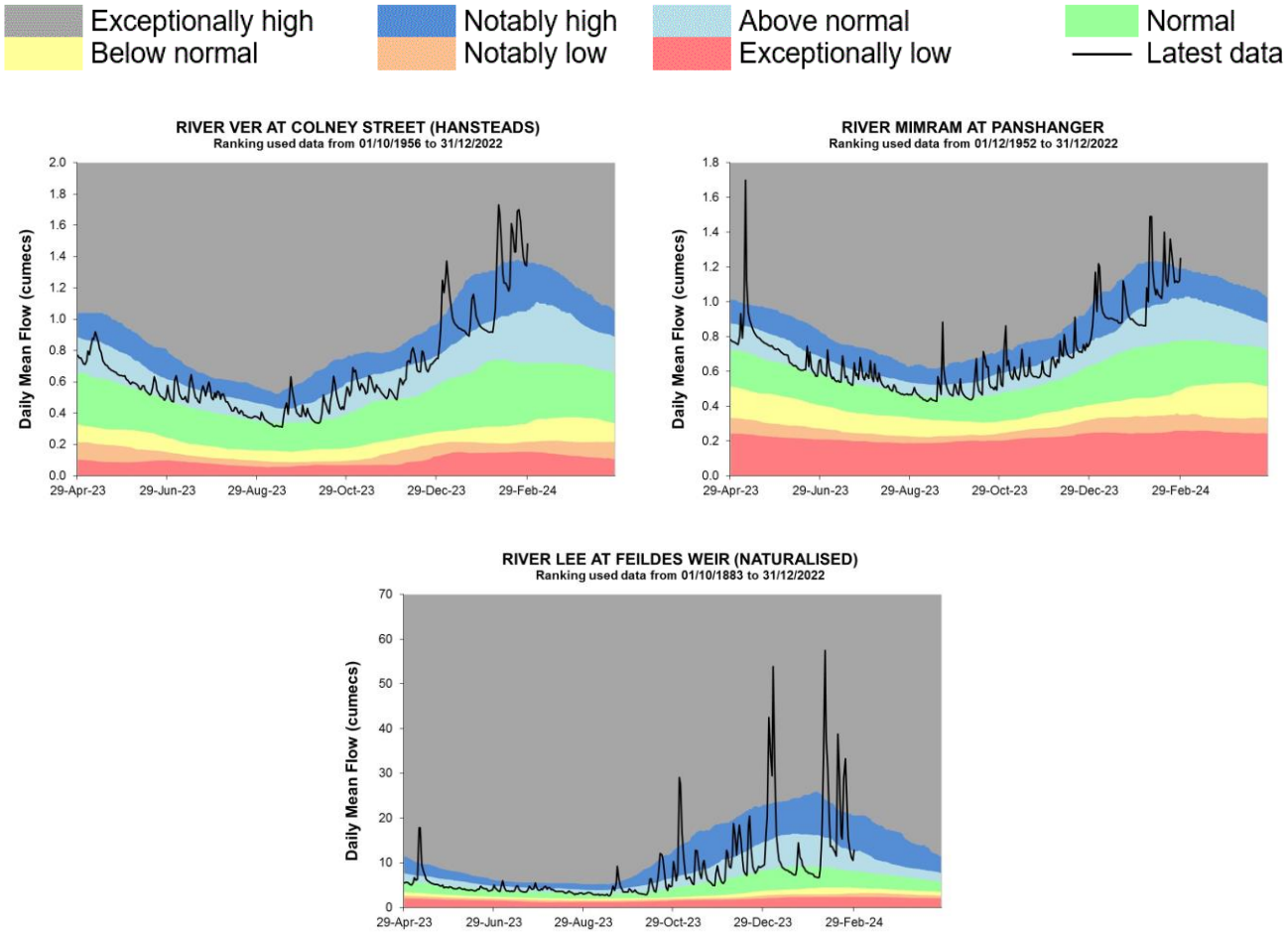


HadUK rainfall data. (Source: Met Office. Crown copyright, 2024).

EA effective rainfall data (Source EA Soil Moisture Model, 2024).

5.2 HNL River flow charts

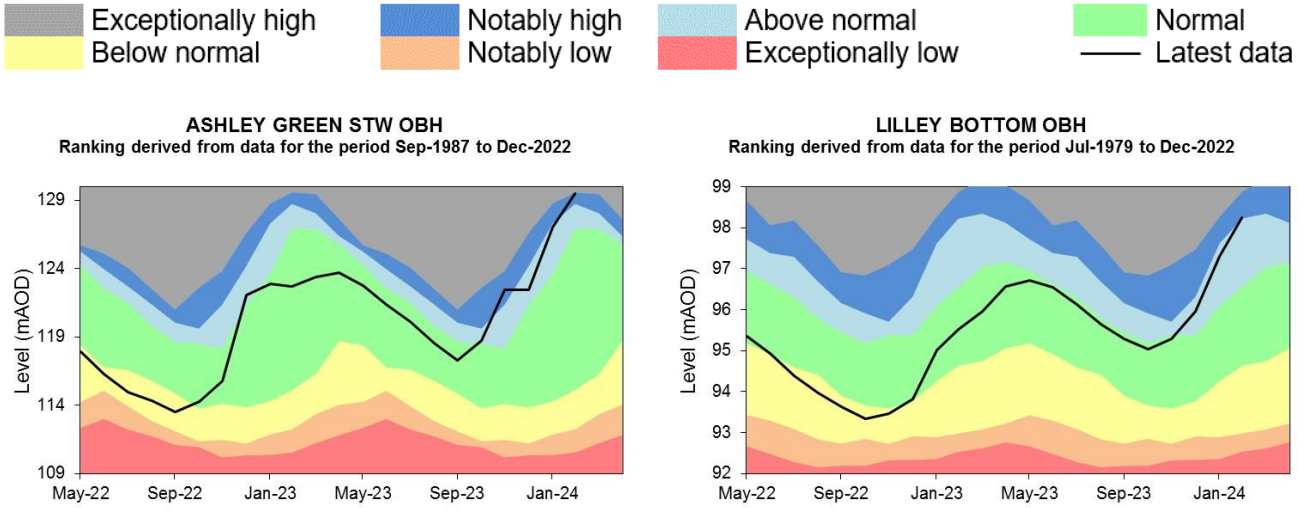
Figure 5.2 Daily mean river flow for index sites over the past year, compared to an analysis of historic daily mean flows, and long term maximum and minimum flows.



Source: Environment Agency. 2024

5.3 HNL Groundwater level charts

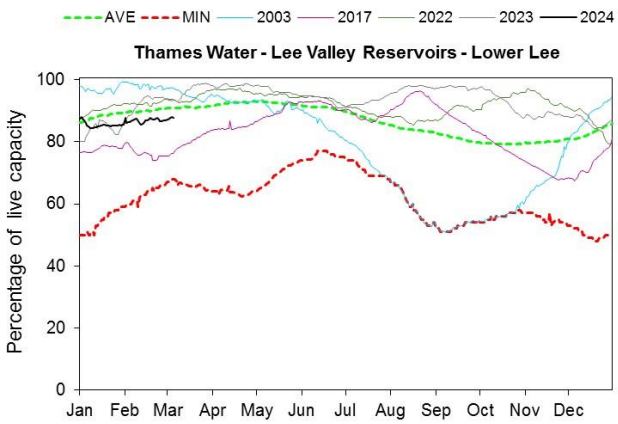
Figure 5.3: End of month groundwater levels at index groundwater level sites for major aquifers. 22 months compared to an analysis of historic end of month levels and long term maximum and minimum levels.



Source: Environment Agency, 2024.

5.4 HNL Reservoir stocks

Figure 5.4: End of month regional reservoir stocks 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.

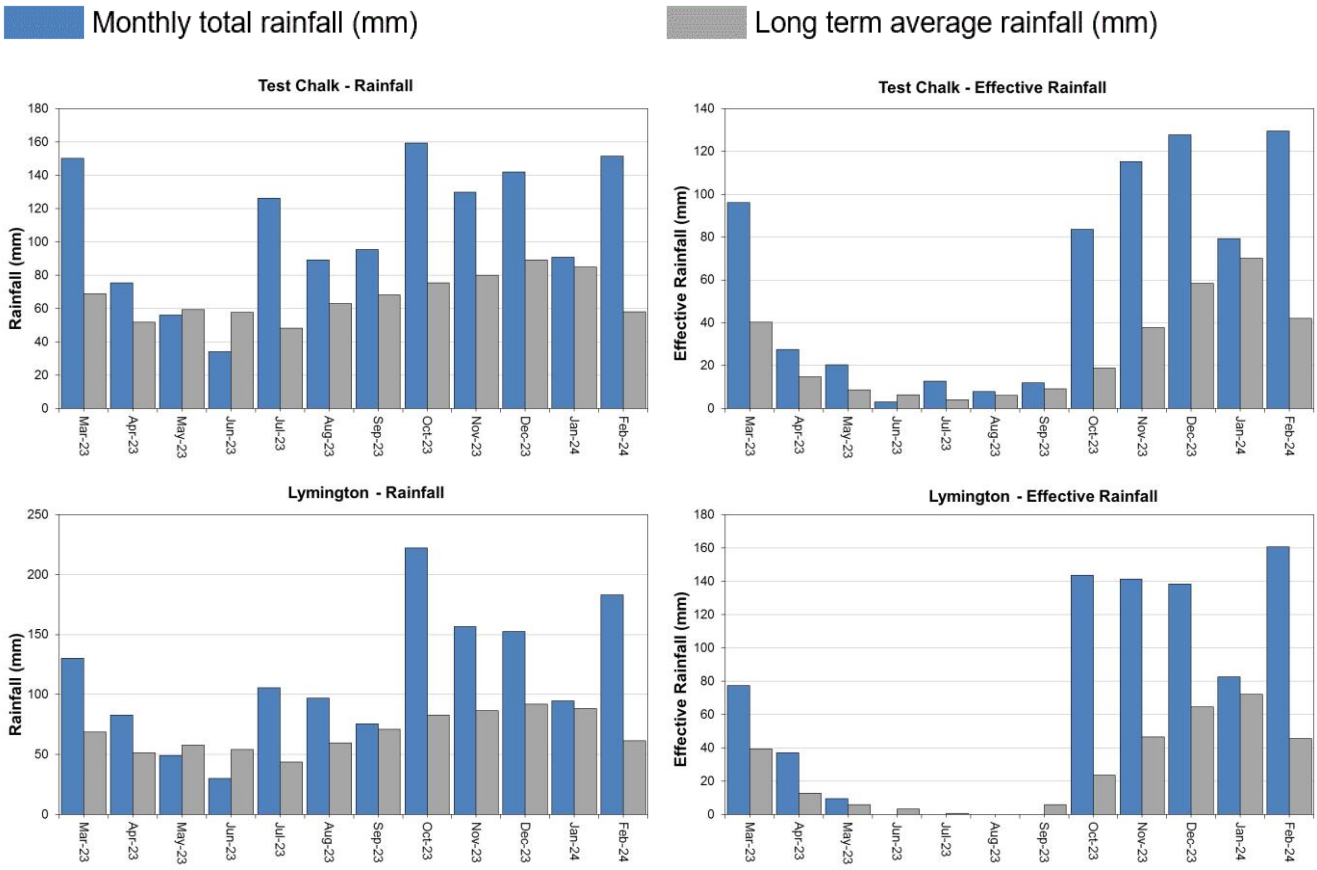


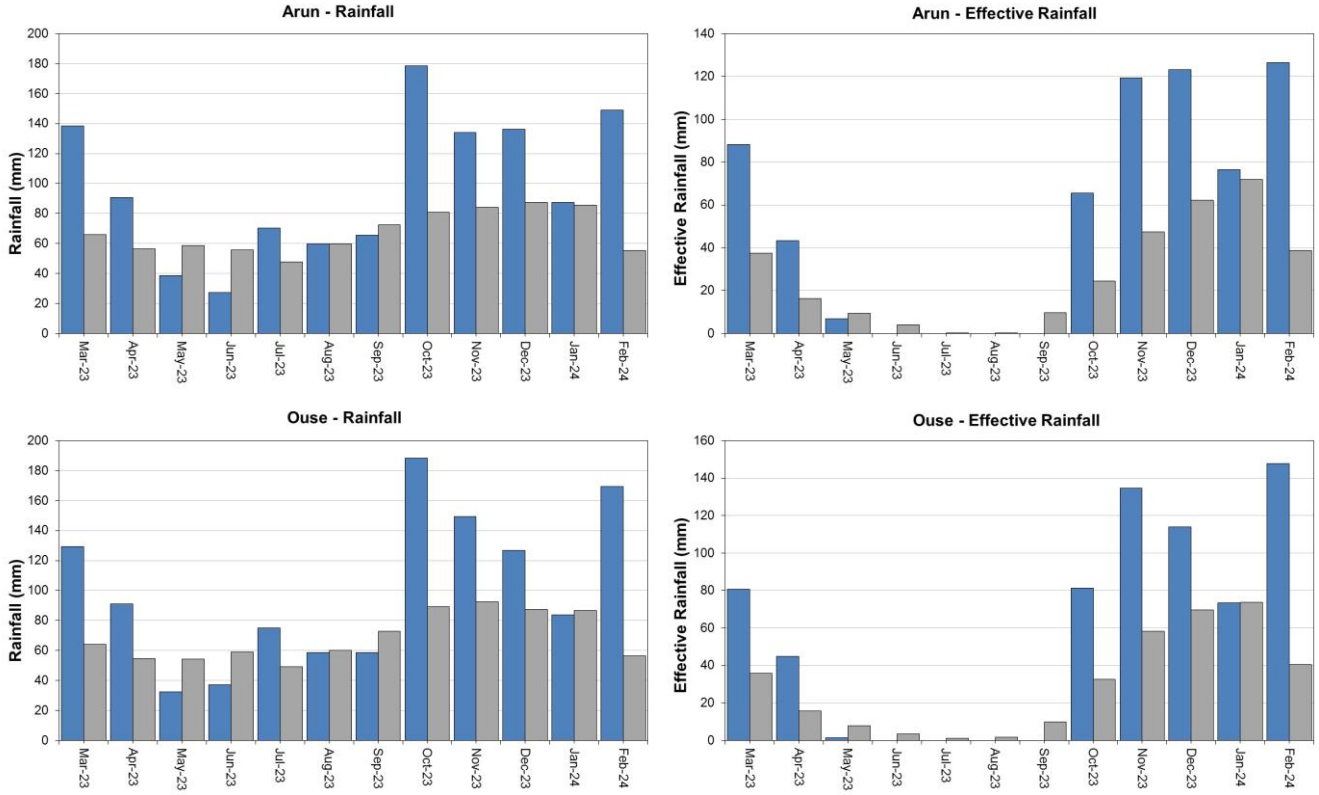
(Source: water companies).

6 Solent and South Downs (SSD)

6.1 SSD 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 a selection of areal units.



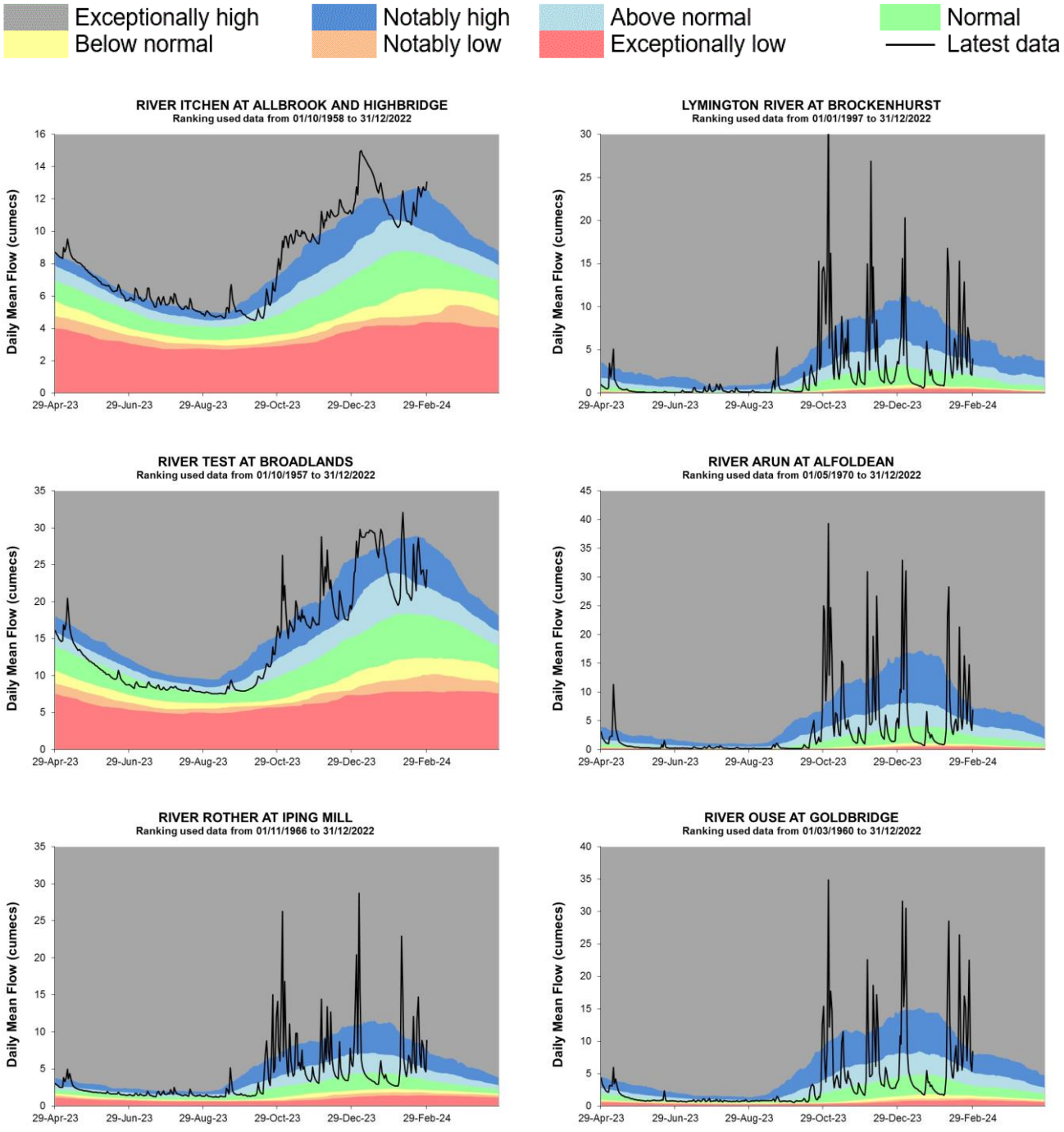


HadUK rainfall data. (Source: Met Office. Crown copyright, 2024).

EA effective rainfall data (Source EA Soil Moisture Model, 2024).

6.2 SSD River flow charts

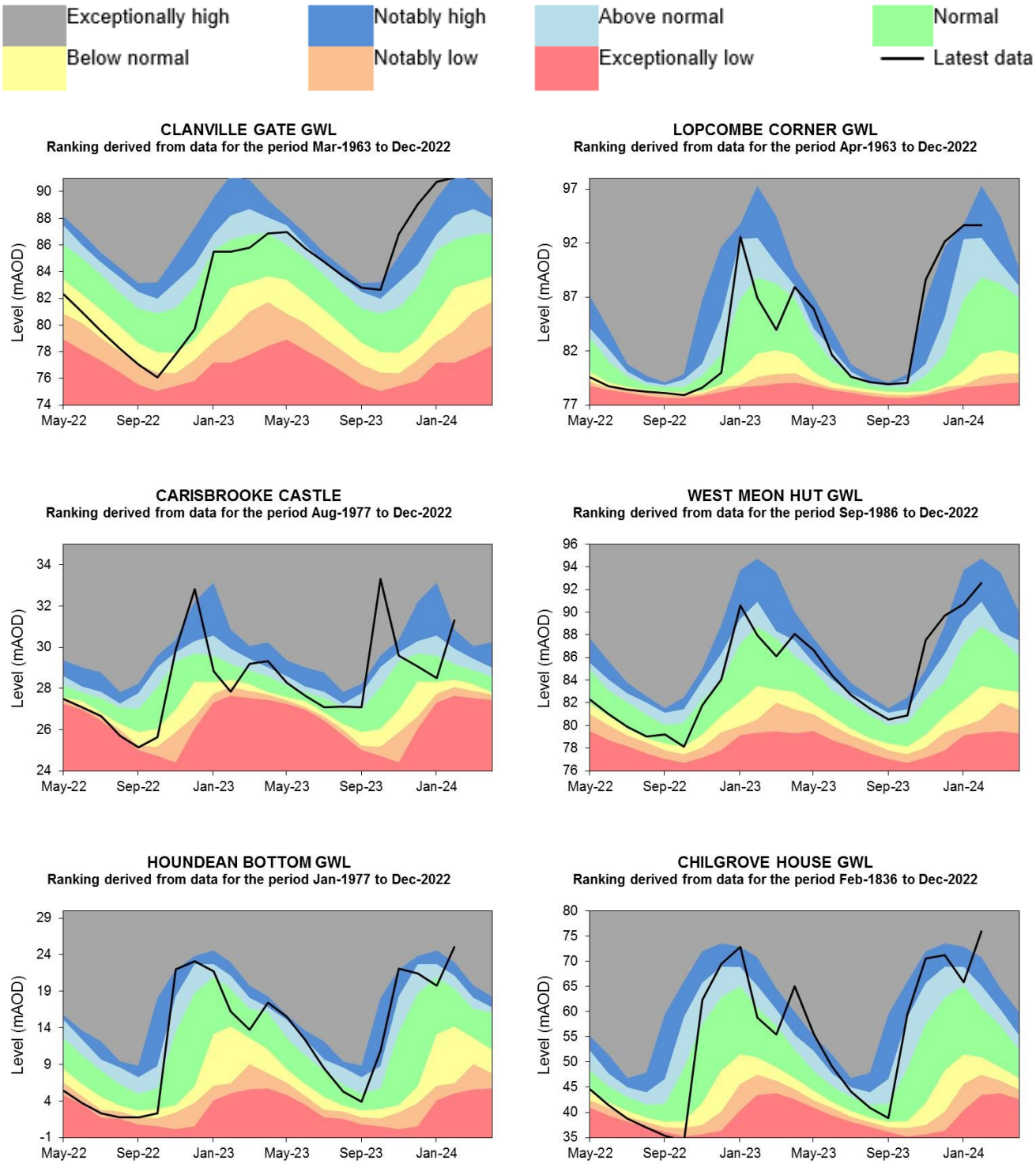
Figure 6.2: Daily mean river flow for index sites over the past year, compared to an analysis of historic daily mean flows, and long term maximum and minimum flows.



Source: Environment Agency. 2024

6.3 SSD Groundwater levels

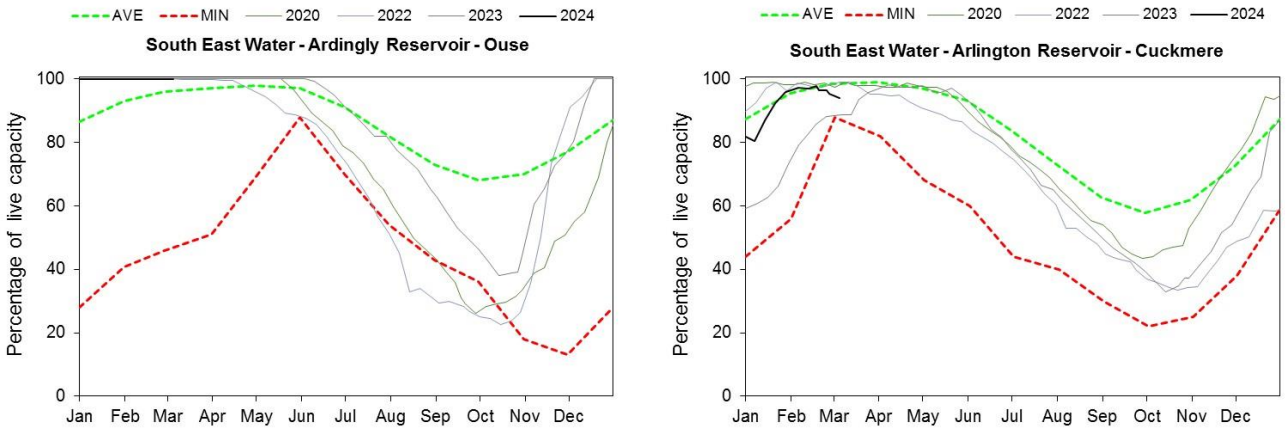
Figure 6.3: End of month groundwater levels at index groundwater level sites for major aquifers. 22 months compared to an analysis of historic end of month levels and long term maximum and minimum levels.



Source: Environment Agency, 2024.

6.4 SSD Reservoir stocks

Figure 6.4: End of month regional reservoir stocks 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.

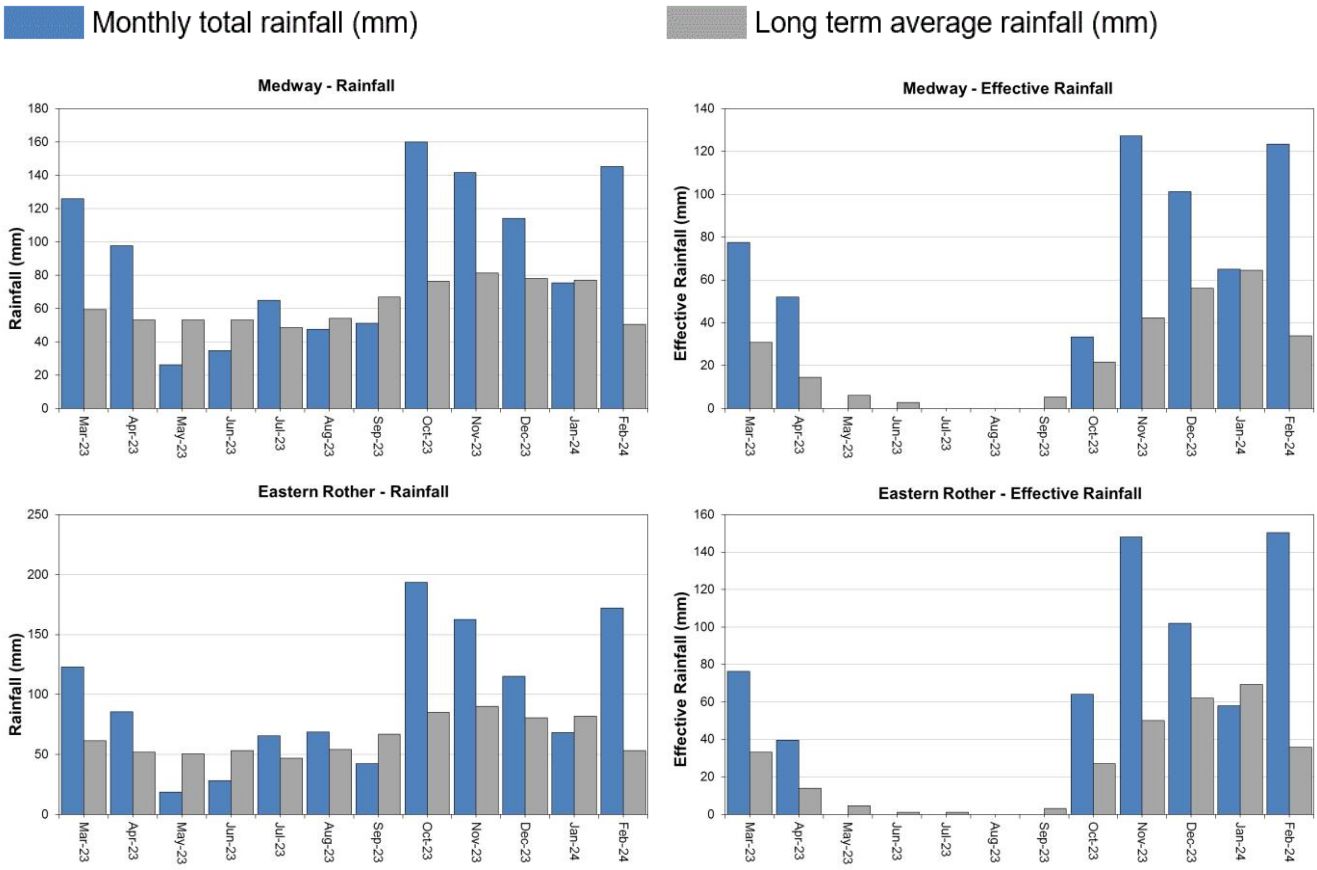


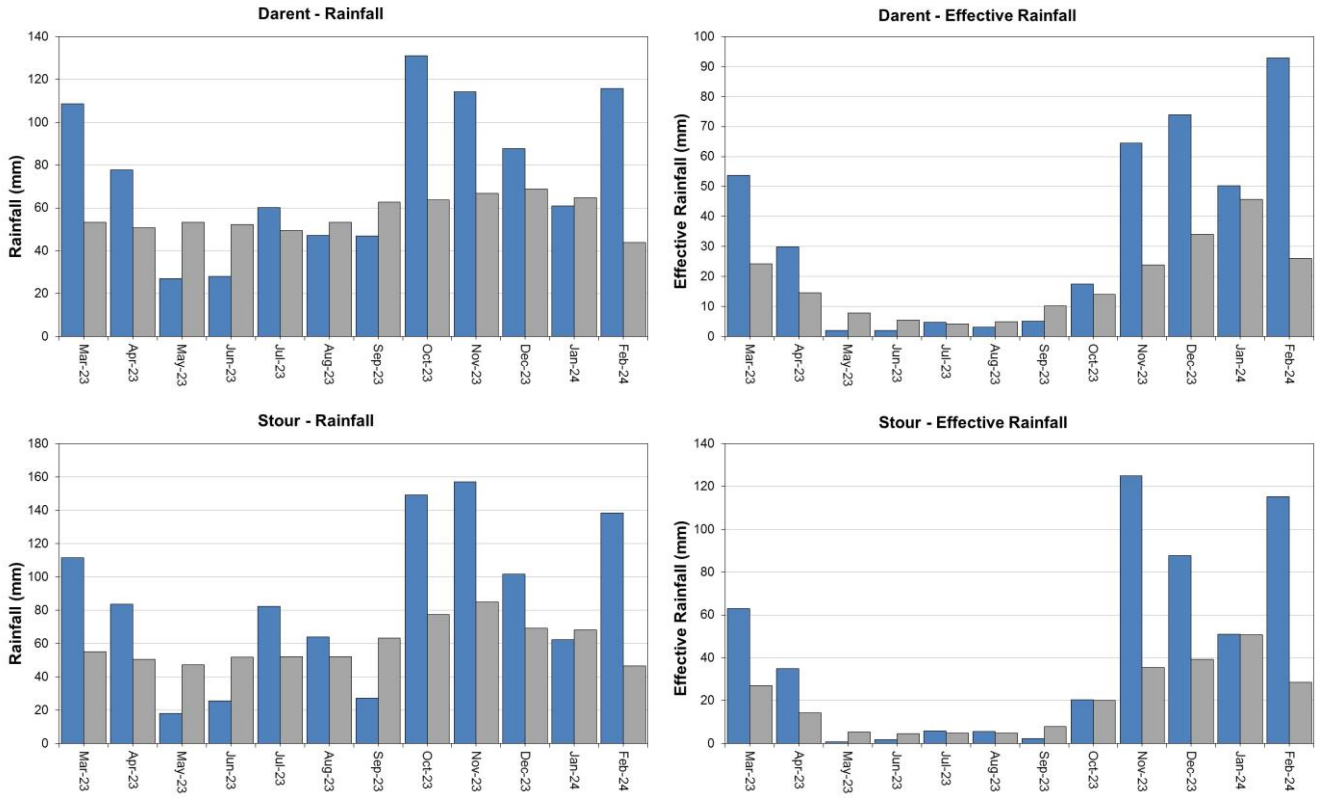
(Source: water companies).

7 Kent and South London (KSL)

7.1 KSL 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 a selection of areal units.



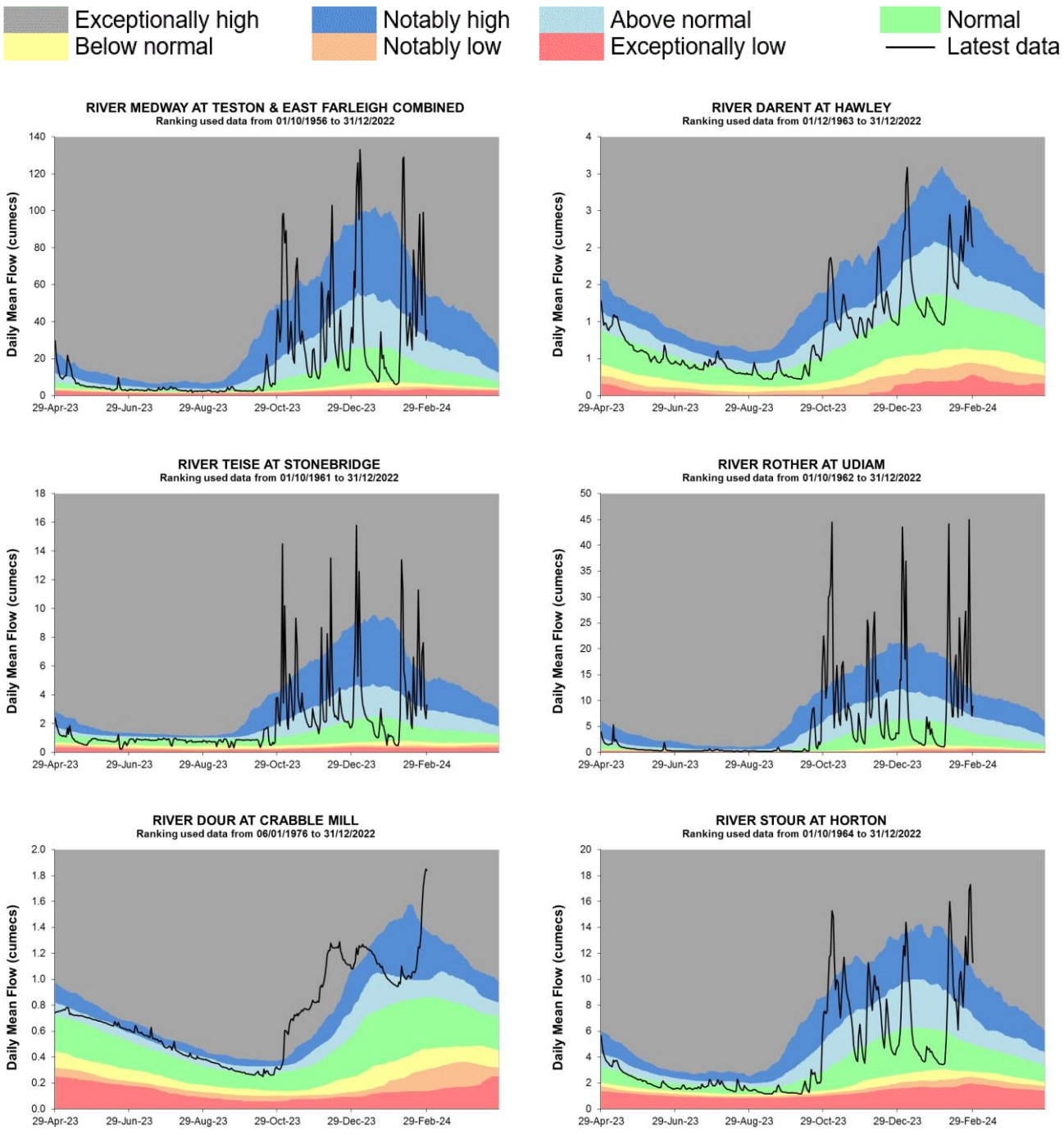


HadUK rainfall data. (Source: Met Office. Crown copyright, 2024).

EA effective rainfall data (Source EA Soil Moisture Model, 2024).

7.2 KSL River flow charts

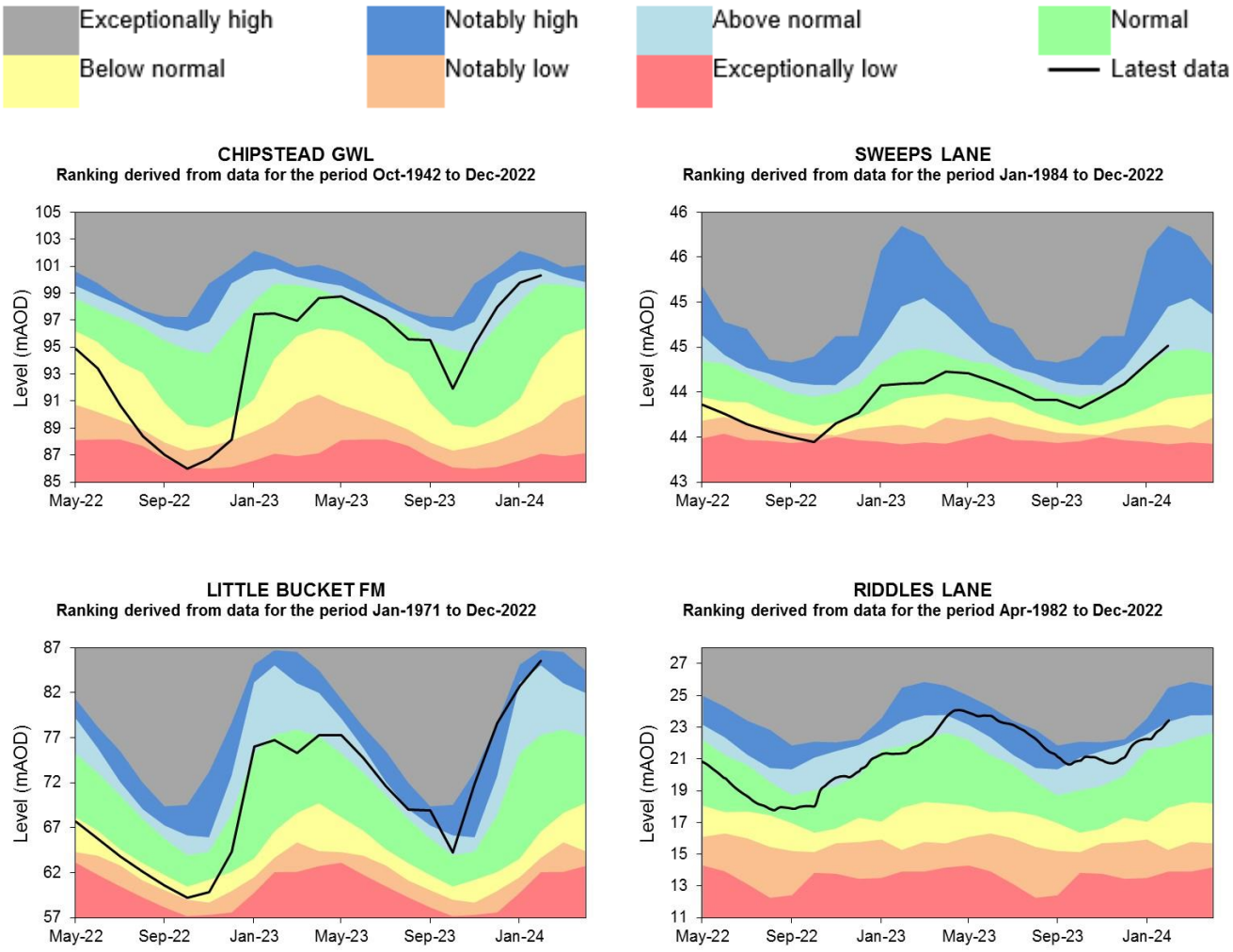
Figure 7.2: Daily mean river flow for index sites over the past year, compared to an analysis of historic daily mean flows, and long term maximum and minimum flows.



Source: Environment Agency. 2024 .

7.3 KSL Groundwater levels

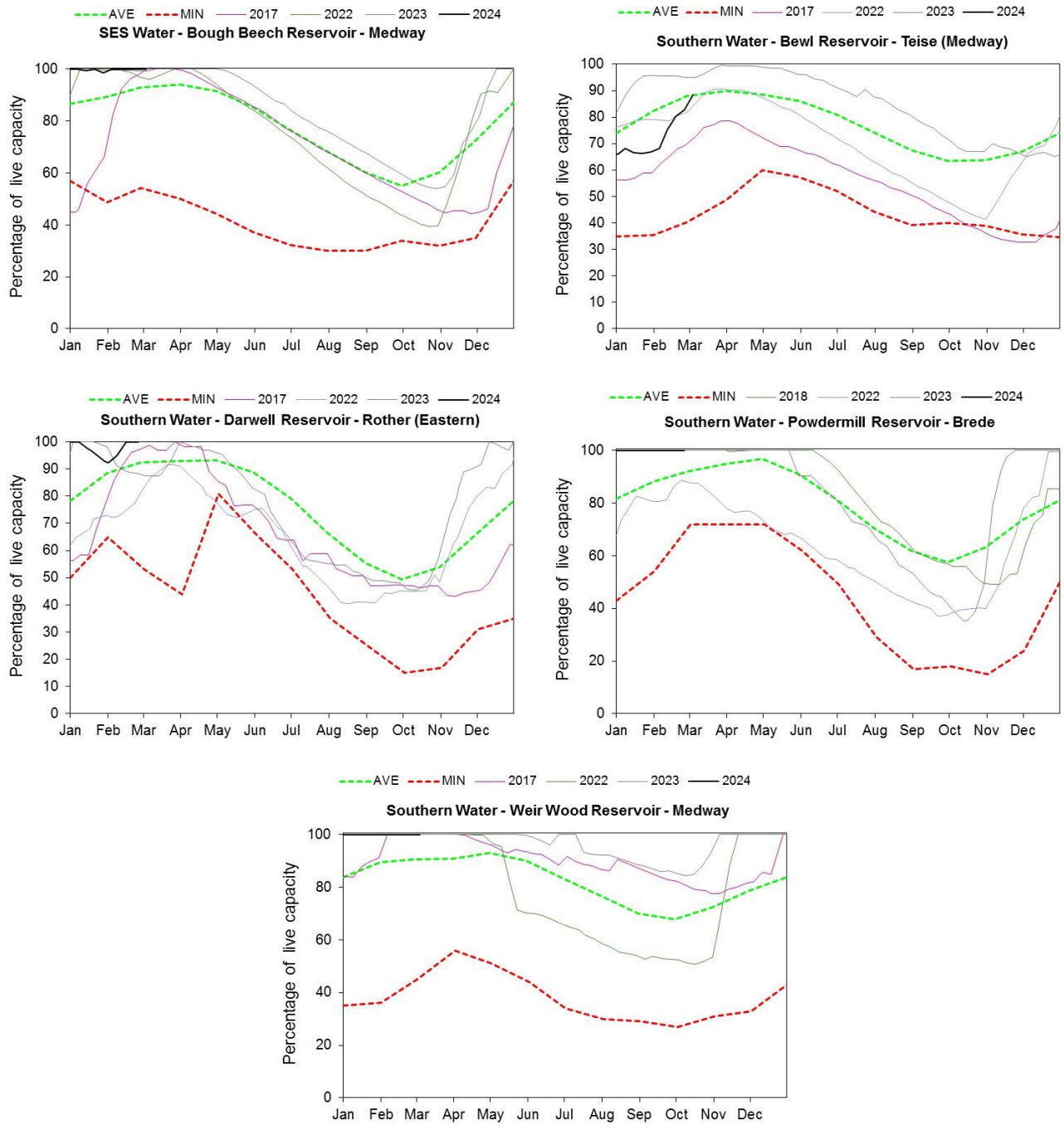
Figure 7.3: End of month groundwater levels at index groundwater level sites for major aquifers. 22 months compared to an analysis of historic end of month levels and long term maximum and minimum levels.



Source: Environment Agency. 2024

7.4 KSL Reservoir stocks

Figure 7.4: End of month regional reservoir stocks 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).

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
Cotswold West	110	Normal	Notably high	Normal	Below normal
Cotswold East	106	Normal	Notably high	Normal	Below normal
Berkshire Downs	133	Above Normal	Notably high	Normal	Below normal
Chilterns West	108	Normal	Notably high	Normal	Normal
Chilterns East Colne	111	Normal	Notably high	Normal	Below normal
North Downs - Hampshire	133	Above Normal	Exceptionally high	Above normal	Normal
North Downs South London	109	Normal	Notably high	Normal	Below normal
Upper Thames	116	Normal	Notably high	Normal	Below normal
Upper Cherwell	97	Normal	Notably high	Normal	Normal
Thame	98	Normal	Above normal	Normal	Below normal
Loddon	122	Normal	Exceptionally high	Above normal	Normal
Lower Wey	111	Normal	Exceptionally high	Notably high	Normal
Upper Mole	123	Normal	Exceptionally high	Notably high	Normal
Lower Lee	108	Normal	Notably high	Normal	Normal
North London	99	Normal	Notably high	Normal	Below normal
South London	96	Normal	Notably high	Normal	Below normal
Roding	100	Normal	Notably high	Normal	Below normal
Ock	104	Normal	Above normal	Normal	Below normal
Enborne	128	Normal	Notably high	Normal	Normal
Cut	106	Normal	Notably high	Normal	Normal
Lee Chalk	107	Normal	Notably high	Normal	Normal
River Test	144	Above Normal	Exceptionally high	Above normal	Normal
East Hampshire Chalk	144	Above Normal	Exceptionally high	Above normal	Normal

West Sussex Chalk	146	Above Normal	Exceptionally high	Notably high	Normal
East Sussex Chalk	163	Notably High	Exceptionally high	Exceptionally high	Normal
Sw Isle Of Wight	143	Above Normal	Exceptionally high	Notably high	Normal
River Darent	112	Normal	Notably high	Normal	Normal
North Kent Chalk	122	Normal	Notably high	Above normal	Normal
Stour	146	Above Normal	Notably high	Normal	Normal
Dover Chalk	167	Above Normal	Notably high	Above normal	Normal
Thanet Chalk	135	Normal	Above normal	Normal	Below normal
Western Rother Greensand	149	Above Normal	Exceptionally high	Notably high	Normal
Hampshire Tertiaries	143	Above Normal	Exceptionally high	Above normal	Normal
Lymington River Avon Water And O	140	Above Normal	Notably high	Above normal	Normal
Sussex Coast	132	Normal	Exceptionally high	Notably high	Normal
River Arun	136	Above Normal	Exceptionally high	Notably high	Normal
River Adur	141	Above Normal	Exceptionally high	Exceptionally high	Normal
River Ouse	151	Above Normal	Exceptionally high	Exceptionally high	Normal
Cuckmere River	160	Notably High	Exceptionally high	Exceptionally high	Normal
Pevensey Levels	161	Above Normal	Notably high	Above normal	Normal
River Medway	135	Above Normal	Exceptionally high	Notably high	Normal
Eastern Rother	159	Above Normal	Exceptionally high	Above normal	Normal
Romney Marsh	158	Above Normal	Notably high	Above normal	Normal
North West Grain	113	Normal	Notably high	Normal	Below normal
Sheppy	118	Normal	Above normal	Normal	Below normal

9.2 River flows table

Site name	River	Catchment	Feb 2024 band	Jan 2024 band
Colney Street_hansteads	Ver	Colne	Above normal	Above normal
Feildes Weir (nat)	Lee (middle)	Lee	Normal	Above normal
Panshanger	Mimram	Lee	Normal	Normal
Crabble Mill Gs	Dour	Little Stour	Normal	Normal
Hawley Gs	Darent	Darent and Cray	Normal	Above normal
Horton	Great Stour	Stour Kent	Normal	Notably high
Stonebridge	Teise	Teise	Above normal	Notably high
Teston & East Farleigh Combined	Medway100	Medway Estuary	Above normal	Exceptionally high
Udiam Gs	Rother	Rother Kent Lower	Notably high	Exceptionally high
Alfoldean Gs	Arun	Arun	Notably high	Exceptionally high
Allbrook Gs+ Highbridg	Itchen (so)	Itchen	Above normal	Above normal
Broadlands	Test	Test Lower	Normal	Normal
Brockenhurst Gs	Lymington	New Forest	Normal	Above normal
Goldbridge Gs	Ouse [so]	Ouse Sussex	Above normal	Exceptionally high
Iping Mill Gs	Rother	West Rother	Above normal	Exceptionally high
Farmoor	Thames	Thames	Normal	Normal
Kingston	Thames	Thames North Bank	Normal	Normal
Marlborough G.stn	Kennet	Kennet	Normal	Below normal
Sheepbridge	Loddon	Loddon	Above normal	Above normal
Tilford	Wey	Wey Addleston Bourne	Notably high	Exceptionally high

9.3 Groundwater table

Site name	Aquifer	End of Feb 2024 band	End of Jan 2024 band
Ashley Green Stw	Mid-chilterns Chalk	Normal	Normal
Lilley Bottom	Upper Lee Chalk	Normal	Below normal
Little Bucket Fm	East Kent Chalk - Stour	Normal	Below normal
Chipstead Gwl	Epsom North Downs Chalk	Below normal	Notably low
Riddles Lane	North Kent Swale Chalk	Above normal	Notably high
Sweeps Lane Gwl	West Kent Chalk	Normal	Normal
Houndean Bottom Gwl	Brighton Chalk Block	Notably high	Exceptionally high
Chilgrove House Gwl	Chichester-worthing-portsdown Chalk	Notably high	Above normal
Carisbrooke Castle	Isle Of Wight Central Downs Chalk	Notably high	Notably high
West Meon Hut Gwl	River Itchen Chalk	Above normal	Normal
Clanville Gate Gwl	River Test Chalk	Normal	Below normal
Lopcombe Corner Gwl	River Test Chalk	Normal	Normal
Tile Barn Farm	Basingstoke Chalk	Normal	Normal
Rockley Obh	Berkshire Downs Chalk	Normal	Below normal
Jackaments Bottom Obh	Burford Oolitic Limestone (inferior)	Normal	Normal
Stonor Estate	South-west Chilterns Chalk	Below normal	Below normal

9.4 South-east England areal units for reference