Monthly water situation report: South-east England

1 Summary - November 2024

November was a month of two contrasting halves across the south-east of England. The month started by being dominated by high pressure with dull, dry and mild conditions, described by the Meteorological Office as ‘anticyclonic gloom’. Then there was cold weather and patchy light snowfall on 21 November and 2 named storms a few days later. Despite these storms, the south-east of England received only 107% of the long term average (LTA) monthly rainfall. The soil moisture deficits (SMDs) rose slightly in the first half of the month owing to the dry weather. The SMDs ended the month below the LTA at zero or close to zero for most areal rainfall units in Thames (THM), Solent and South Downs (SSD) and Hertfordshire and North London (HNL). Recharge across the south-east of England was significantly higher than the LTA during the month, particularly in THM. The groundwater-fed rivers displayed at least notably high flows towards the north and west. On the Wealdon Clay in Kent, rivers remained in the normal range for the month. There were 108 fluvial flood alerts and 54 fluvial flood warnings issued in November. The cumulative impact of the last 12 months’ rainfall across the south-east of England has been particularly reflected by the high groundwater levels during November.

1.1 Rainfall

November was a month of two contrasting halves across the south-east of England. The month started by being dominated by high pressure with dull, dry and mild conditions, described by the Meteorological Office as ‘anticyclonic gloom’. Then there was cold weather and patchy light snowfall on 21 November and 2 named storms a few days later. The first storm was Bert on 23 and 24 of the month which brought widespread heavy rainfall and strong winds. The second was Storm Conell which resulted in heavy rainfall to the south coast on 26 November. Despite these storms, the south-east of England received only 107% of the LTA monthly rainfall. The wettest area was THM which received 137% of the rainfall LTA for November. Kent and South London (KSL) was the driest and only recorded 87% of the LTA for the month.

The first half of the month accounted for an average of 9% of the monthly total rainfall. The dates of the highest rainfall totals were 24 and 26 November, coinciding with the two storms. The highest daily total was 47.8mm recorded at Grimsbury, THM on 24 November. Calbourne, SSD recorded 45.7mm on 26 November.

1.2 Soil moisture deficit and recharge

The SMDs rose slightly in the first half of the month owing to the dry weather. However, these were reduced significantly after rainfall on 18 November, followed by a reduction to zero after Storm Bert. The SMDs ended the month at zero or close to zero for most areal rainfall units in THM, SSD and HNL. This was significantly below the LTA for November. Some residual deficits remained in KSL which has been significantly drier than the other 3 areas. As there has been a wet start to the winter, with corresponding low SMDs, the recharge across the south-east of England was significantly higher than the LTA during the month, particularly in the west. In THM there was almost 3 times the amount of recharge that we would normally expect for this time of year. The last time THM had this level of recharge for October and November was in 2000.

1.3 River flows

There was some contrast in the response of the indicator flow sites during the month. The groundwater-fed rivers displayed at least notably high flows towards the north and west. The groundwater components of their flows have been supported by the high recharge during the last 3 months. These rivers responded quickly to the rainfall but returned to their high baseflows prior to the storms. Examples included;

- Mimram at Panshanger (HNL) which recorded the highest November flows on record
- Ver at Colney Street (HNL) which also recorded the highest November flows on record
- Kennet at Marlborough (THM) which recorded the fourth highest November flows. The November flows in 2023 were the highest on record

On the Wealdon Clay in Kent, rivers remained in the normal range for the month. Further to the wetter west the rivers draining permeable catchments recorded flows in the above normal or notably high category. Generally, these quicker responding catchments responded rapidly and strongly to the heavy rainfall on 24 and 26 November, then flows dropped away quickly These included

- Loddon at Sheepbridge (THM)
- Lymington at Brockenhurst (SSD)
- Arun at Alfoldean (SSD)
- Medway at Teston and East Farleigh (KSL)
- Teise at Stonebridge (KSL)

There were 108 fluvial flood alerts and 54 fluvial flood warnings issued in November.

	HNL	THM	SSD	KSL	Total
Fluvial Alerts	9	52	29	18	108
Warnings	1	37	13	3	54
Severe Warning	0	0	0	0	0

GW alerts	0	0	0	0	0
Total	10	89	42	21	162

1.4 Groundwater levels

The cumulative impact of the last 12 months' rainfall across the south-east of England has been particularly reflected by the high groundwater levels during November. The highest levels were recorded in the Chilterns (HNL and THM), Berkshire Downs (THM) and the Test Chalk (SSD) during the month. The following sites recorded their highest November levels on record;

- Ampney Crucis, Cotswolds (THM)
- Stonor Estate, Chilterns (THM)
- Lilley Bottom, Chilterns (HNL)

Indicator sites on the North and South Downs were mainly in the above normal category. Groundwater levels rose at 10 of the 16 indicator sites across the south-east and were at notably high or higher at 8 sites.

1.5 Reservoir stocks

The reservoirs remained above average for November at all of the reservoirs across the south-east with two exceptions. Storage at Arlington (SSD) and Bewl (KSL) ended the month below the monthly LTA.

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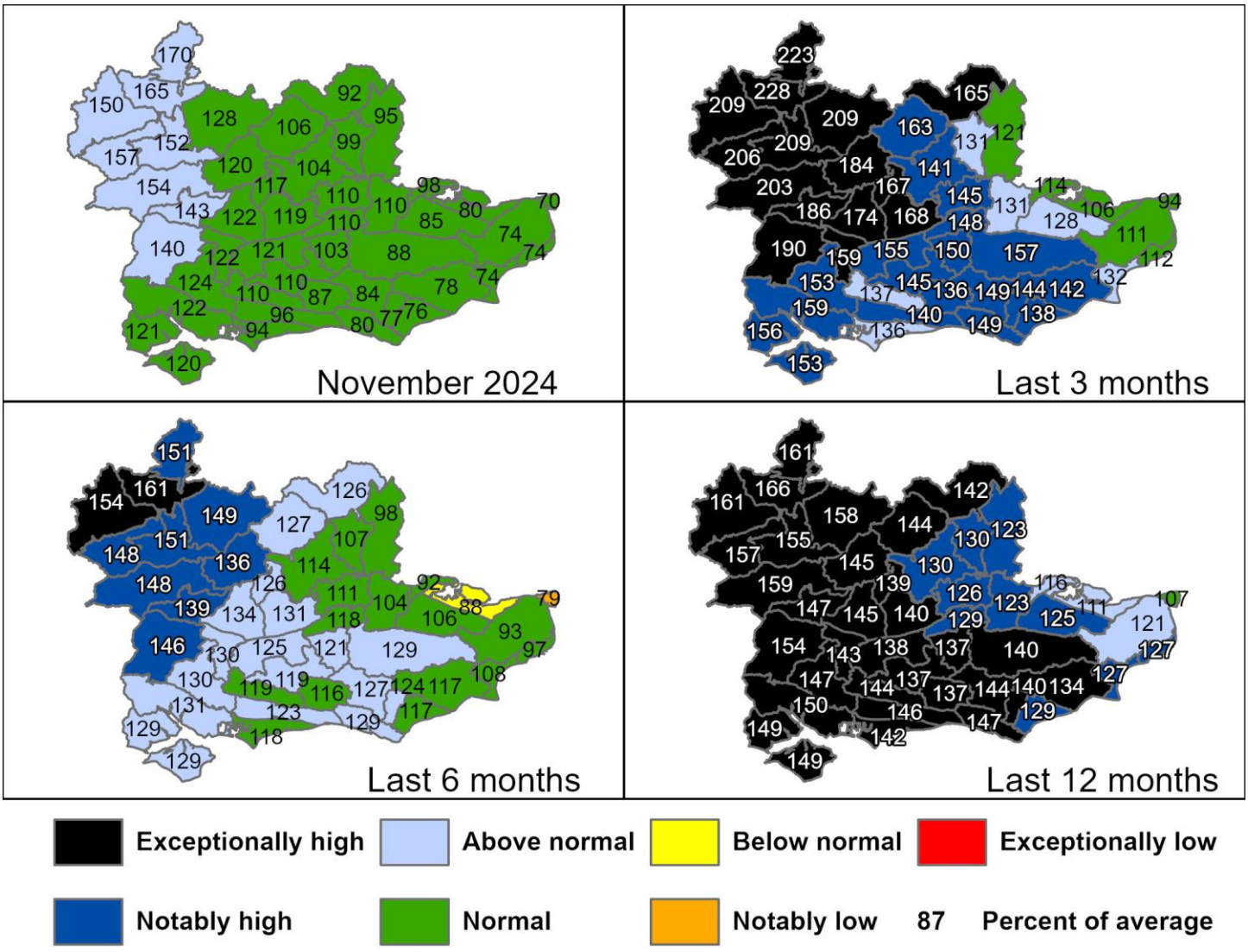
2 Maps

2.1 Rainfall map

Figure 2.1: Total rainfall for hydrological areas for the current month (up to 30 November 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.

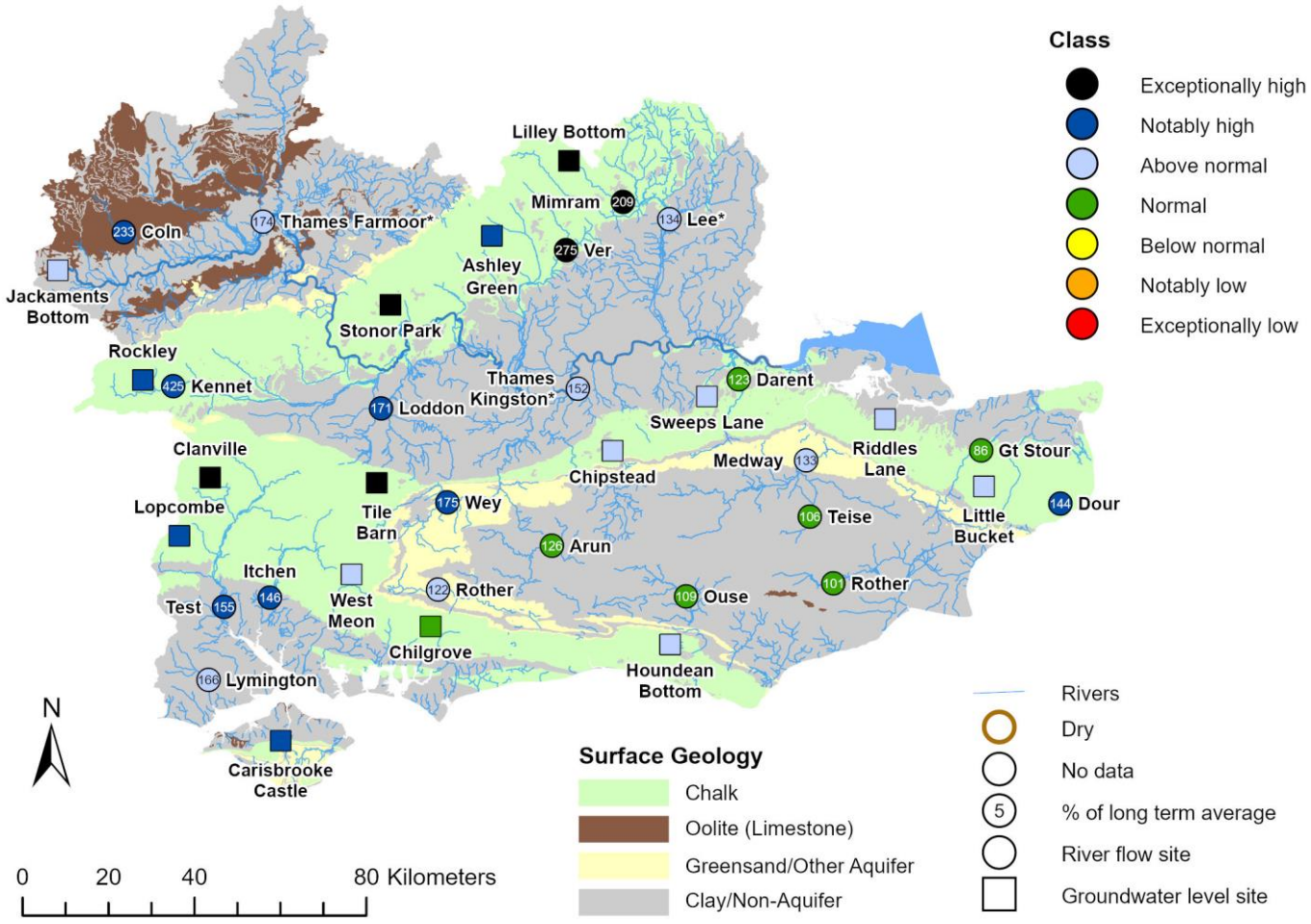


Rainfall data for 2024, extracted from Environment Agency 1km gridded rainfall dataset derived from Environment Agency intensity rain gauges. (Source: Environment Agency. Crown Copyright, 100024198, 2024). Rainfall data prior to 2024, extracted from Met Office HadUK 1km gridded rainfall dataset derived 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 November 2024, expressed as a percentage of the respective long term average and classed relative to an analysis of historic November monthly means Table available in the appendices with detailed information. Groundwater levels for indicator sites at the end of November 2024, classed relative to an analysis of respective historic November 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) 30 day Total	November % LTA	Effective Rainfall (mm) 30 day total	November % LTA	SMD (mm) Day 30	End Nov LTA
6010TH	Cotswolds - West (A)	107	150%	85	207%	0	17
6070TH	Berkshire Downs (G)	111	155%	90	316%	0	40
6130TH	Chilterns - West (M)	81	119%	60	235%	0	44
6162TH	North Downs - Hampshire (P)	105	121%	85	192%	0	31
6190TH	Wey - Greensand (S)	100	121%	82	191%	0	31
	Thames Average	92	137%	71	275%	0	38
	Thames Catchment Average	89	131%	69	251%	0	38
6140TH	Chilterns - East - Colne (N)	71	105%	50	192%	0	44
6600TH	Lee Chalk	56	93%	35	207%	1	64
6507TH	North London	63	103%	40	254%	1	49
6509TH	Roding	54	94%	0	0%	7	53
	Herts and North London	61	99%	30	176%	2	52
6230TH	North Downs - South London (W)	83	109%	63	173%	1	34
6706So	Darent	73	110%	15	62%	1	47

6707So	North Kent Chalk	63	85%	29	100%	1	41
6708So	Stour	63	74%	12	35%	1	39
6809So	Medway	72	88%	55	131%	1	22
	Kent & South London Average	66	87%	34	112%	14	44
6701So	Test Chalk	112	140%	92	245%	0	33
6702So	East Hampshire Chalk	112	124%	94	180%	0	25
6703So	West Sussex Chalk	93	96%	76	126%	0	22
6804So	Arun	93	110%	75	158%	0	23
6805So	Adur	77	87%	60	112%	0	19
	Solent & South Downs Average	91	102%	74	148%	0	25
	South East Average	81	107%	57	170%	4	37

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 01/10/2024 to 30/11/2024

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)	204	144%	158	253%
6070TH	Berkshire Downs (G)	194	139%	149	346%
6130TH	Chilterns - West (M)	162	121%	116	298%
6162TH	North Downs - Hampshire (P)	202	121%	152	224%
6190TH	Wey - Greensand (S)	194	120%	132	198%
	Thames Average	172	130%	123	330%
	Thames Catchment Average	169	126%	120	298%
6140TH	Chilterns - East - Colne (N)	144	107%	97	240%
6600TH	Lee Chalk	119	101%	56	213%
6507TH	North London	121	100%	40	184%
6509TH	Roding	100	90%	0	0%
	Herts and North London	120	100%	44	171%
6230TH	North Downs - South London (W)	162	108%	97	166%

6706So	Darent	130	99%	21	55%
6707So	North Kent Chalk	153	108%	40	86%
6708So	Stour	160	99%	24	43%
6809So	Medway	167	106%	124	194%
	Kent & South London Average	149	102%	58	127%
6701So	Test Chalk	220	142%	174	308%
6702So	East Hampshire Chalk	218	123%	168	207%
6703So	West Sussex Chalk	206	109%	154	162%
6804So	Arun	188	114%	135	188%
6805So	Adur	176	101%	133	161%
	Solent & South Downs Average	195	111%	142	185%
	South East Average	167	113%	102	202%

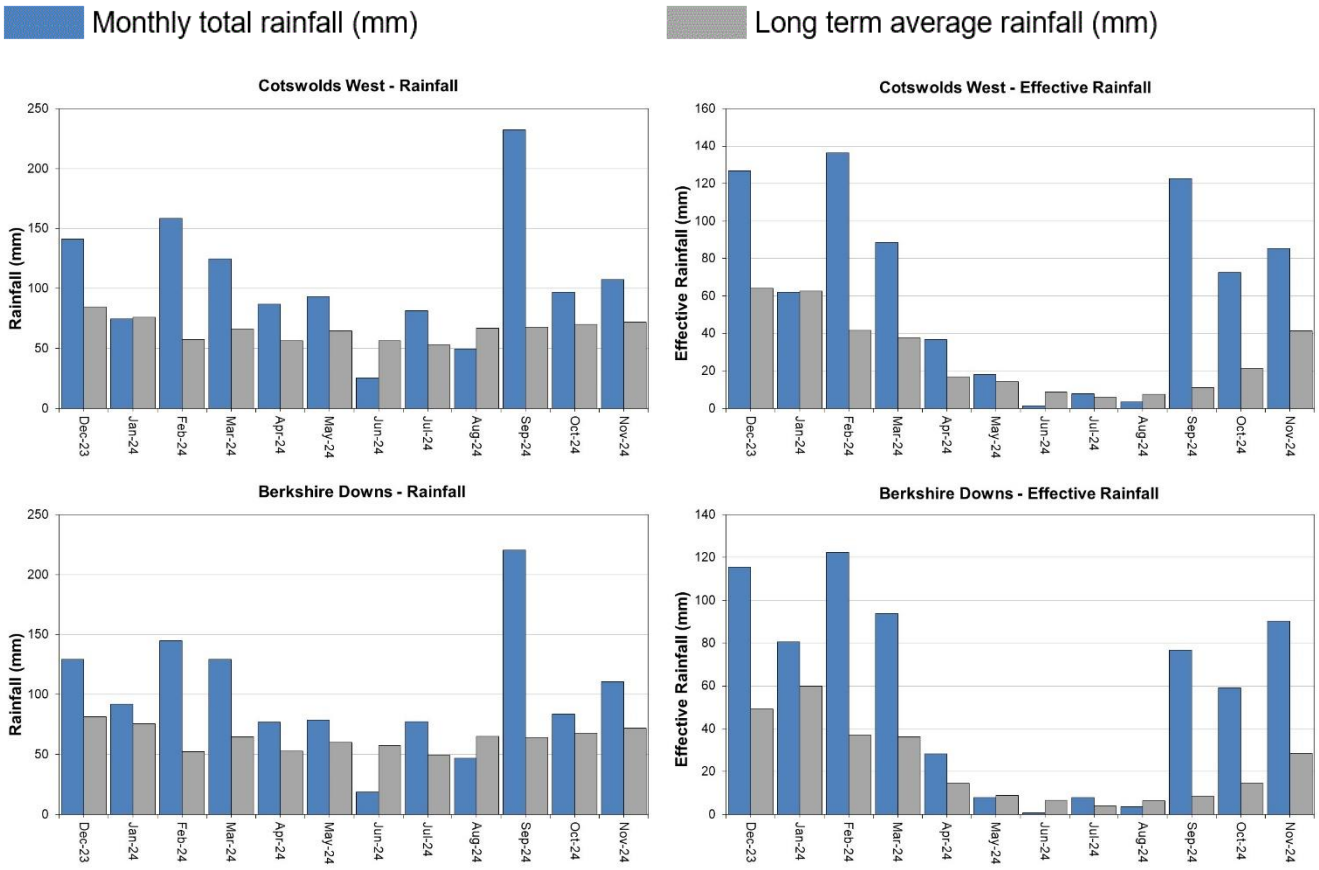
HadUK rainfall data. (Source: Met Office. Crown copyright, 2024).

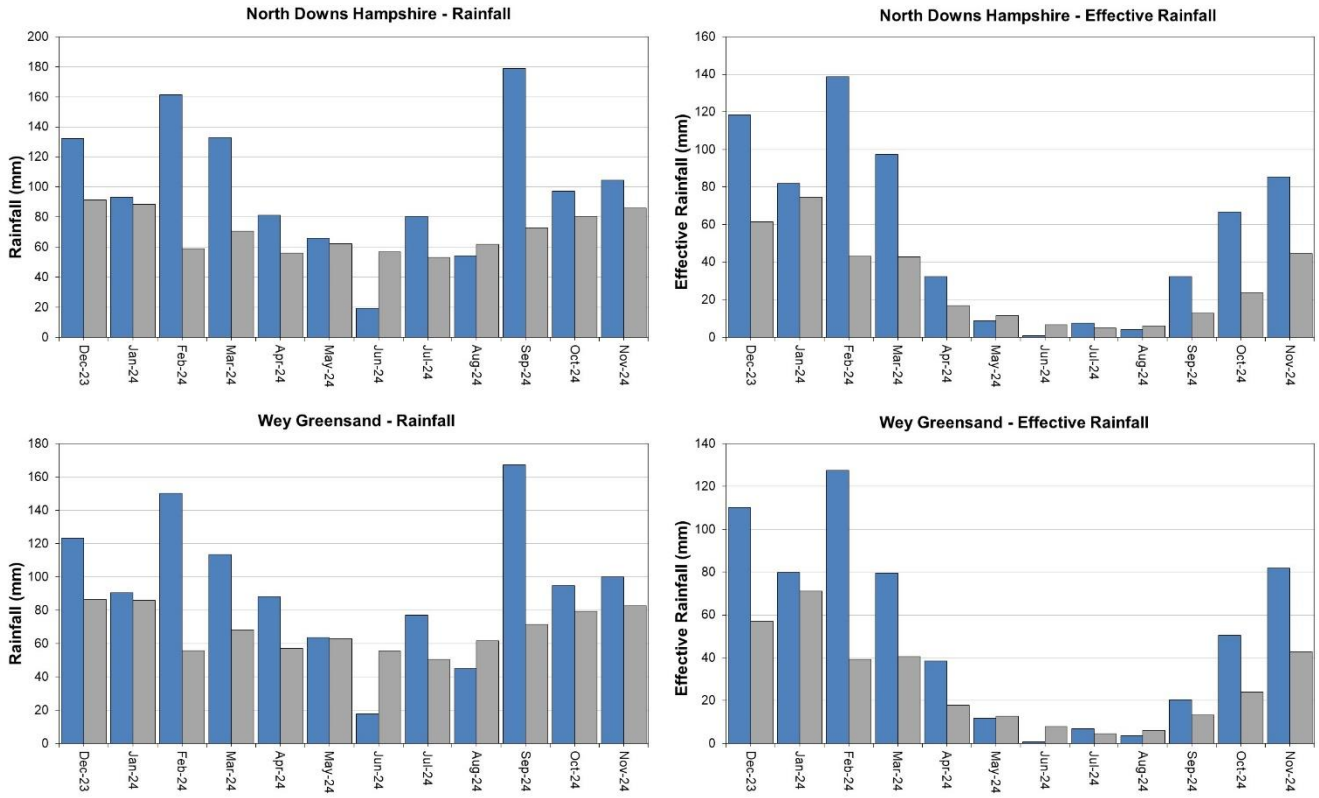
EA effective rainfall data (Source EA Soil Moisture Model 2024.)

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.



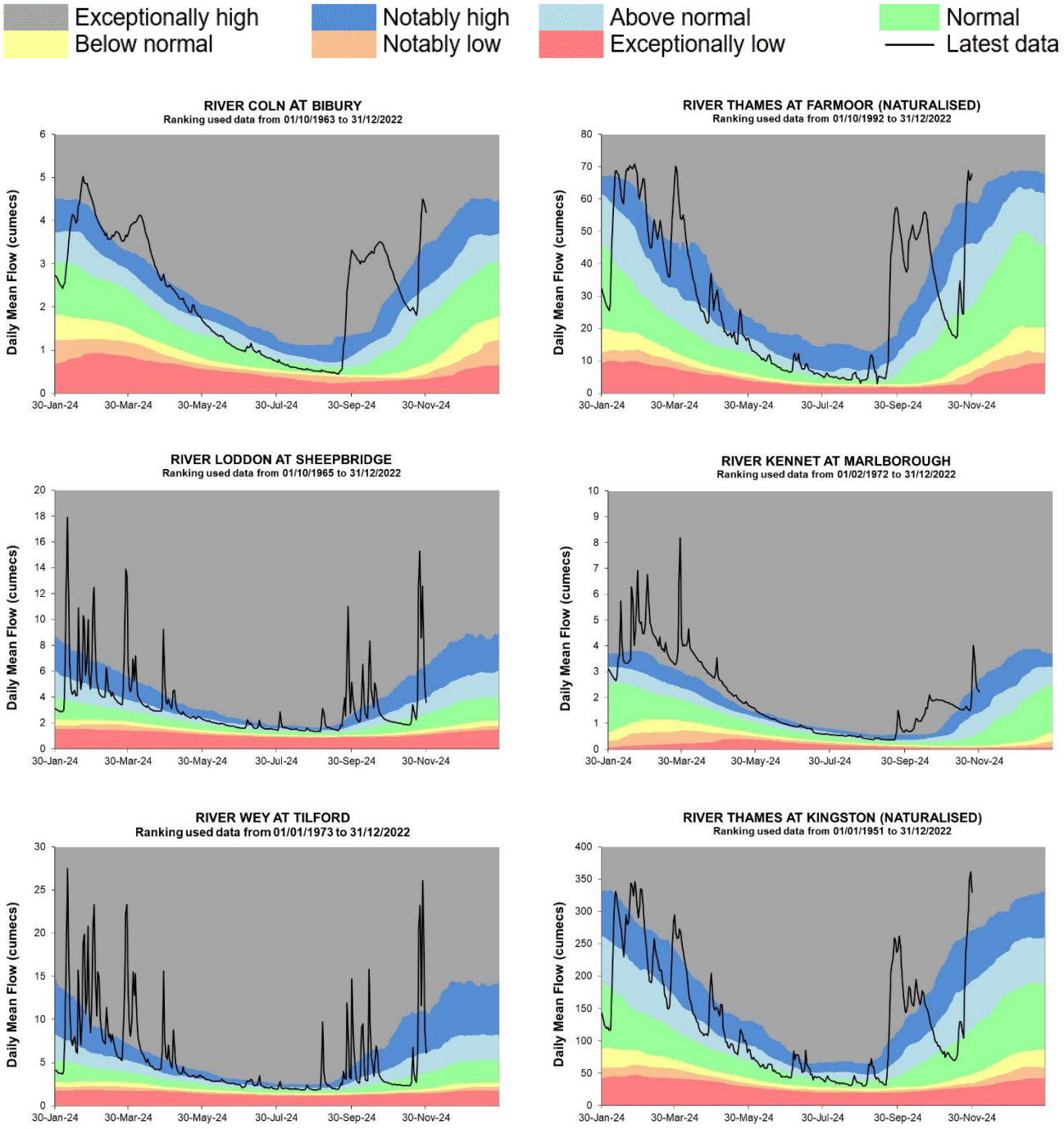


HadUK rainfall data. (Source: Met Office. Crown copyright, 2024).

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

4.2 Thames River flow charts

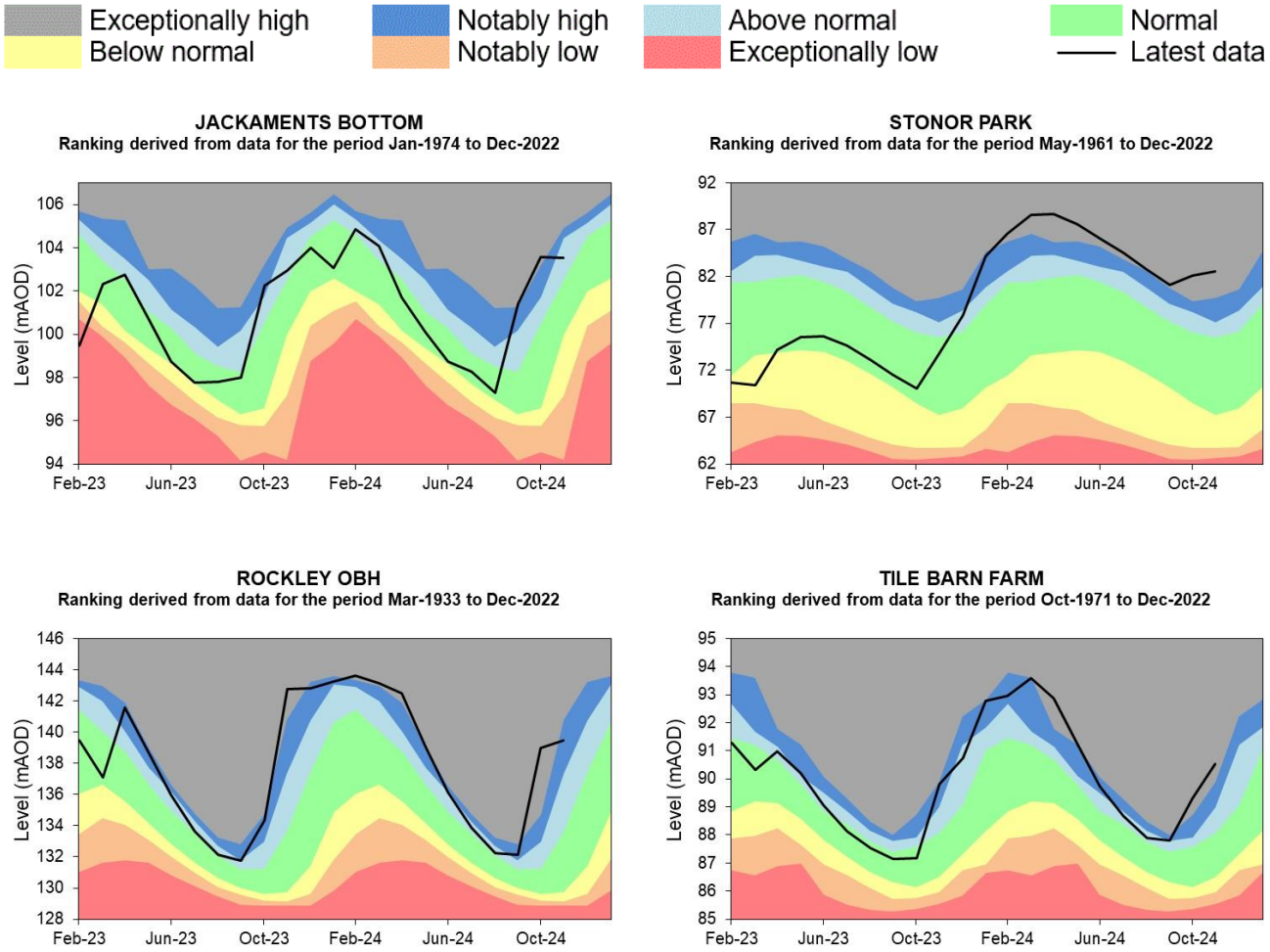
Figure 4.2: Daily mean river flow for index sites over the past year, compared to an analysis of historic daily mean flows, and long term maximum and minimum flows.



Source: Environment Agency. 2024

4.3 Thames Groundwater level charts

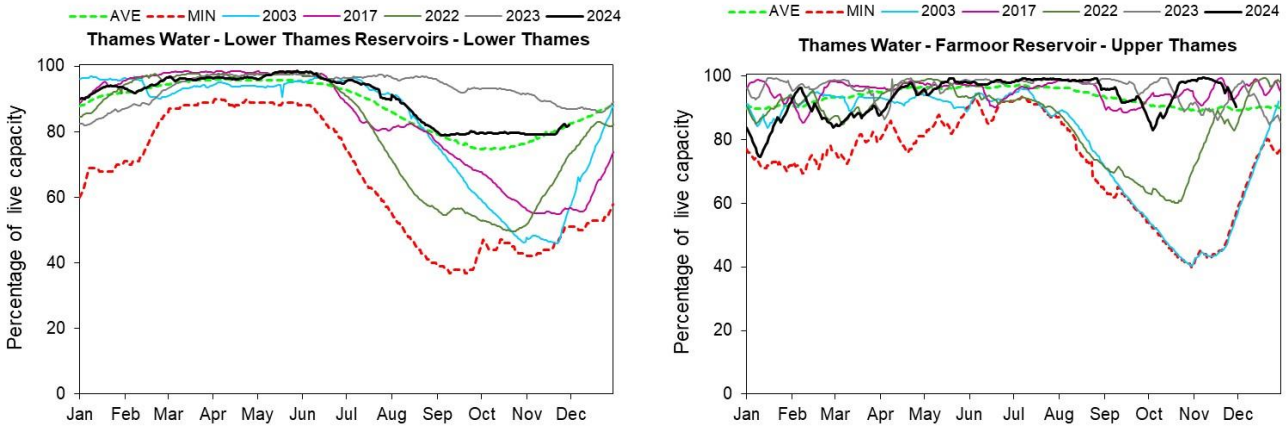
Figure 4.3: End of month groundwater levels at index groundwater level sites for major aquifers. 22 months compared to an analysis of historic end of month levels and long term maximum and minimum levels. Tile Barn Farm data has been estimated from 2 local sites since April 2022. A replacement is planned.



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.

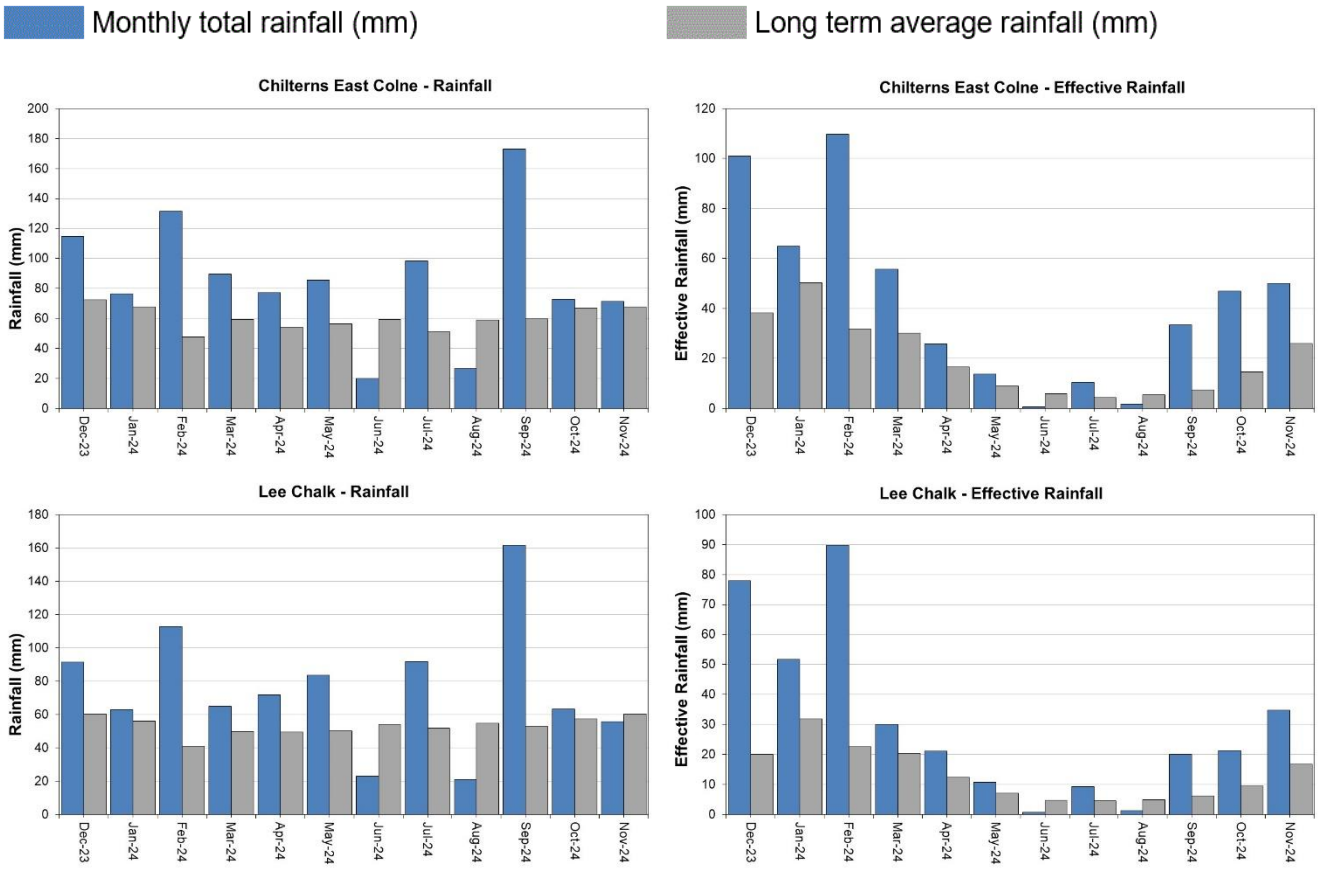


(Source: water companies).

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).

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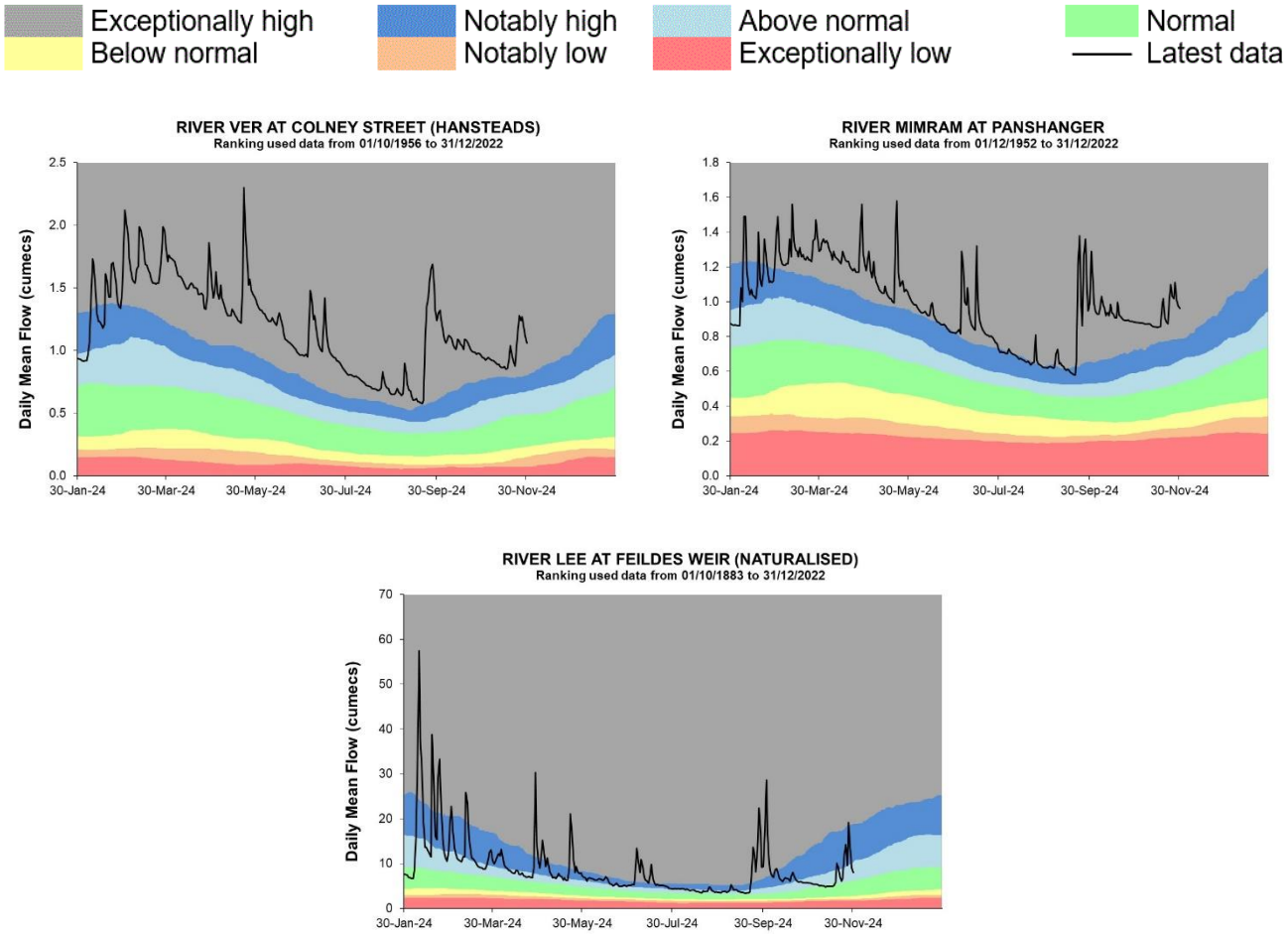

Source: Environment Agency. 2024

5.3 HNL Groundwater level charts

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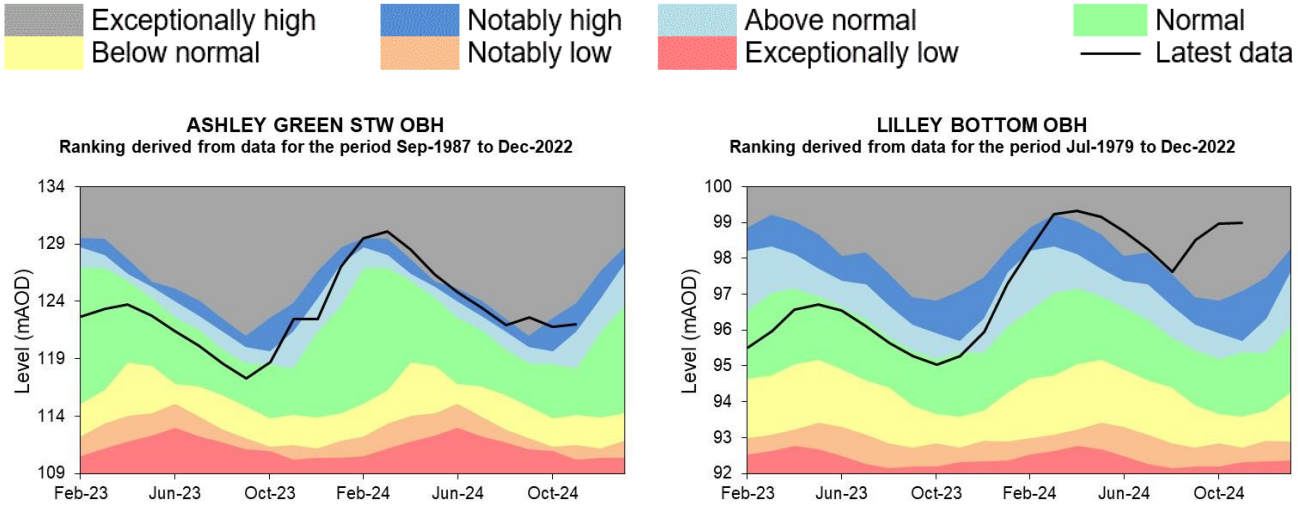

Source: Environment Agency, 2024.

5.4 HNL Reservoir stocks

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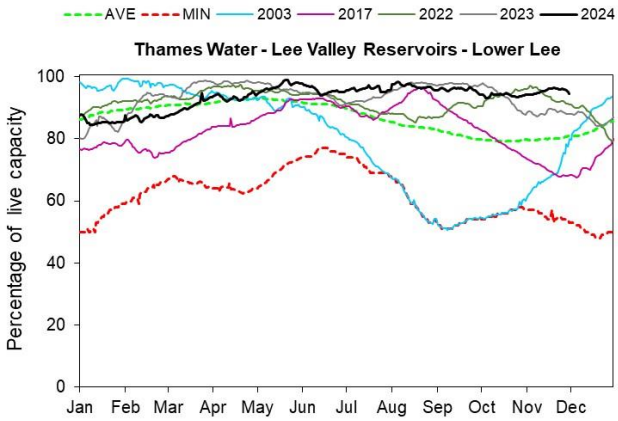
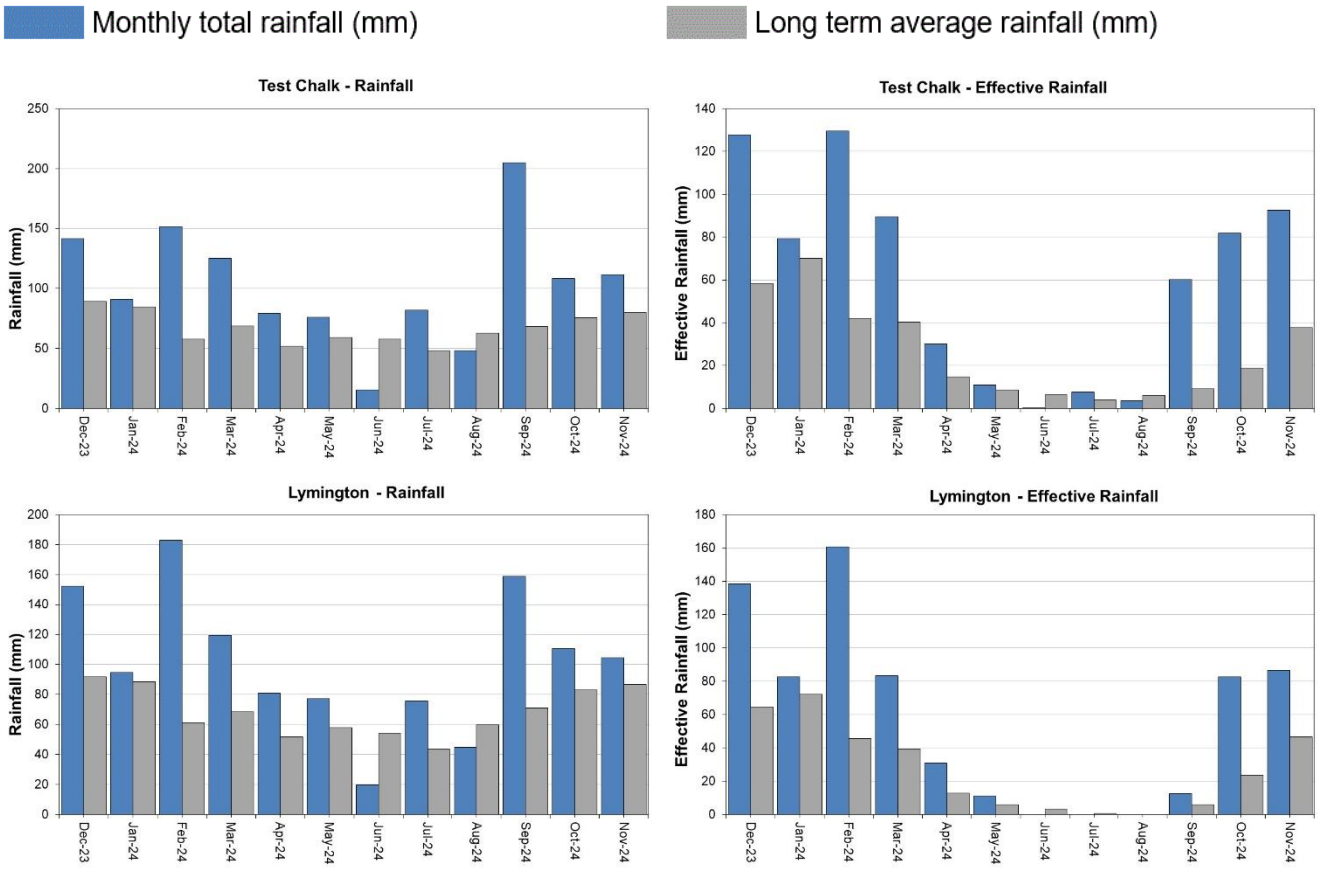


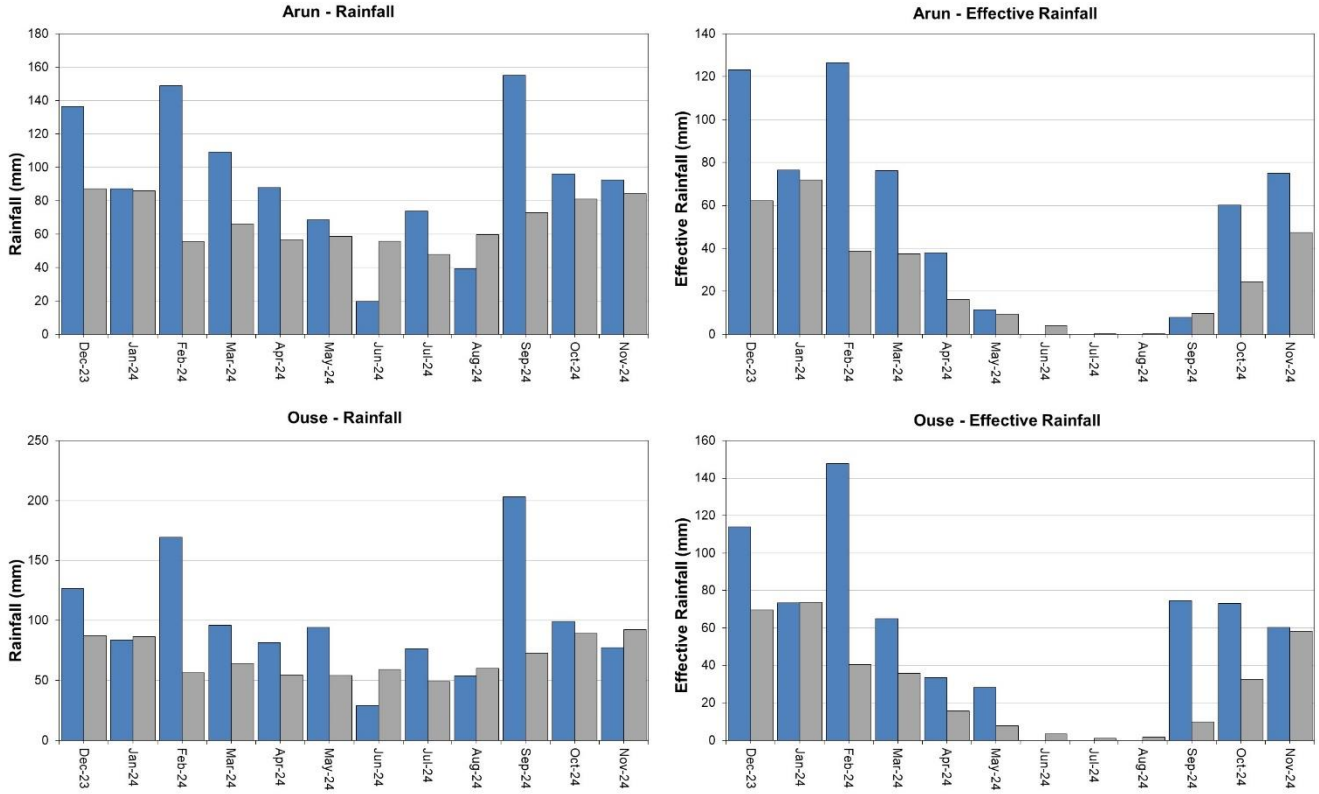
(Source: water companies).

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.



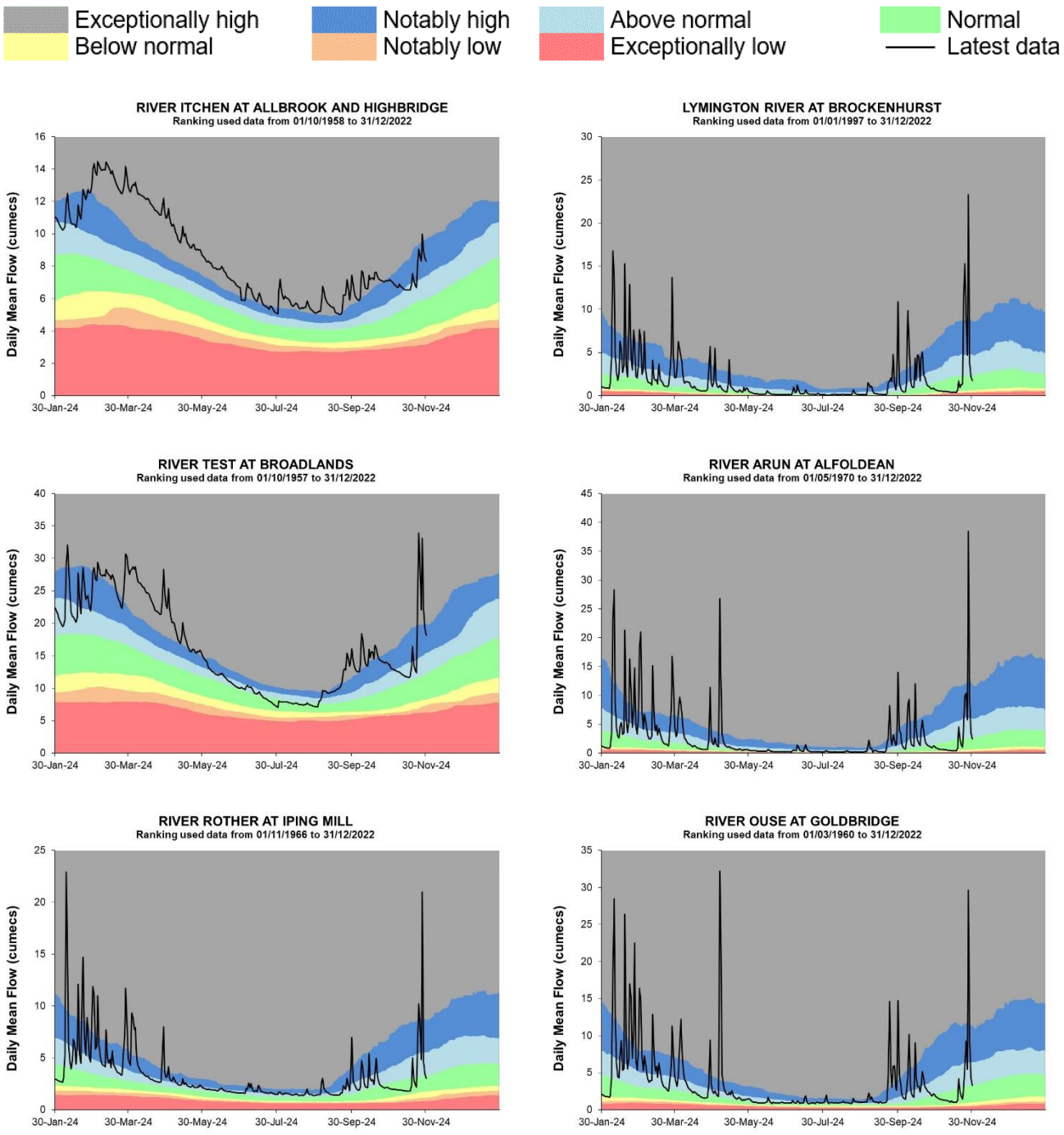


HadUK rainfall data. (Source: Met Office. Crown copyright, 2024).

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

6.2 SSD River flow charts

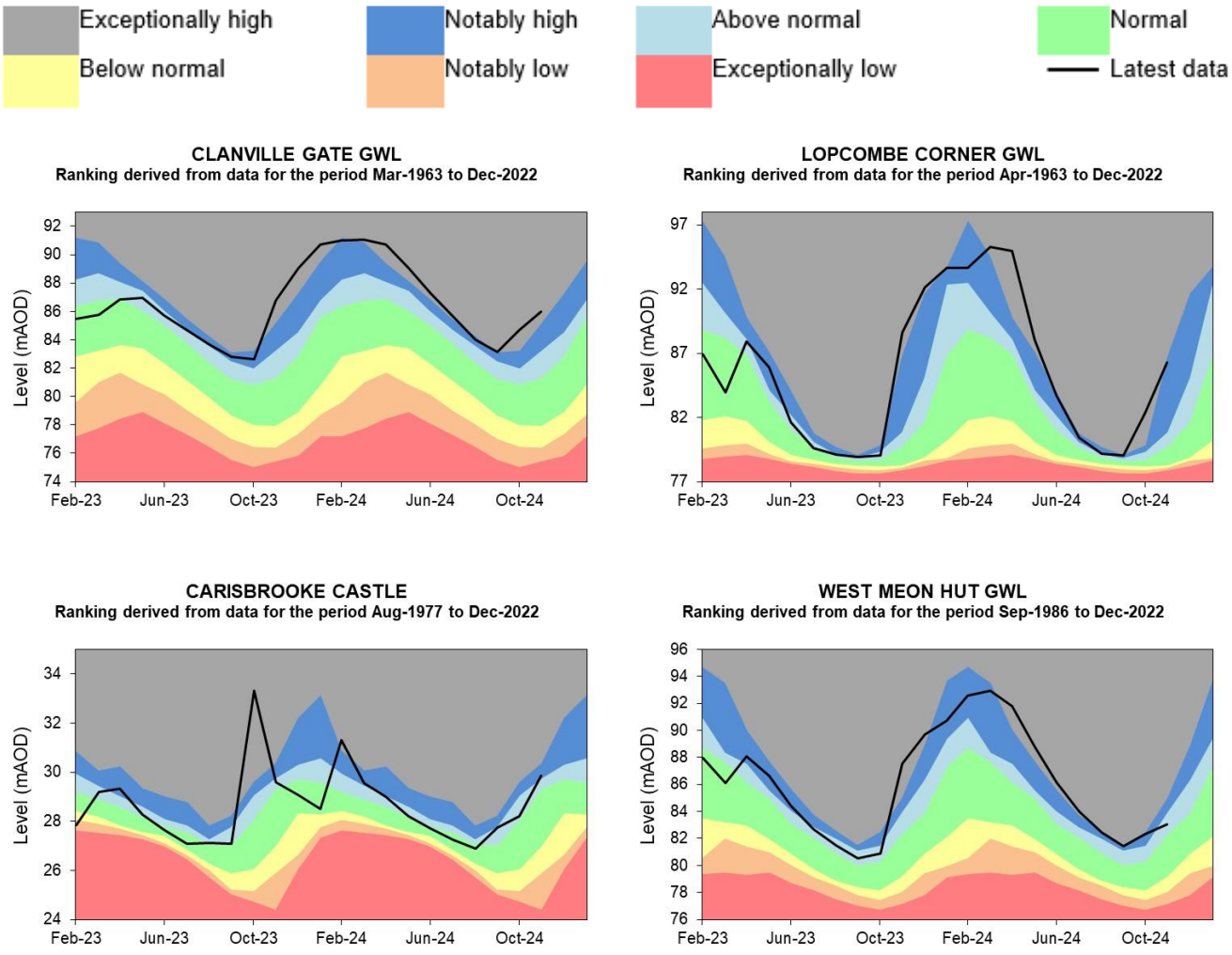
Figure 6.2: Daily mean river flow for index sites over the past year, compared to an analysis of historic daily mean flows, and long term maximum and minimum flows.

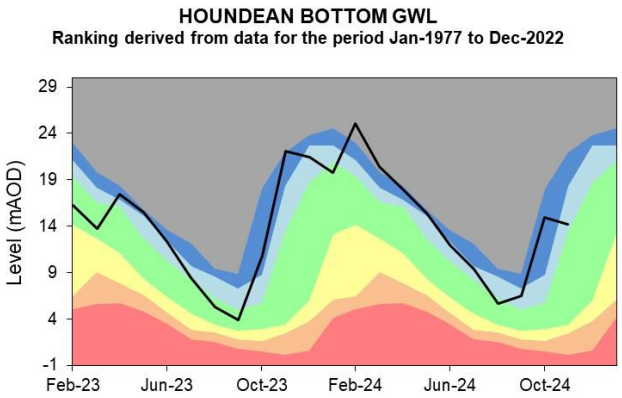


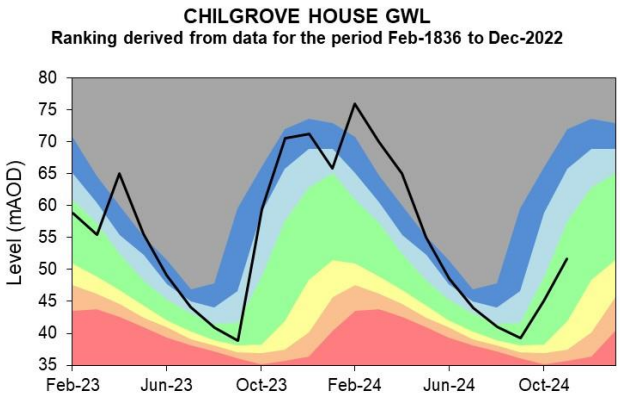
Source: Environment Agency. 2024

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

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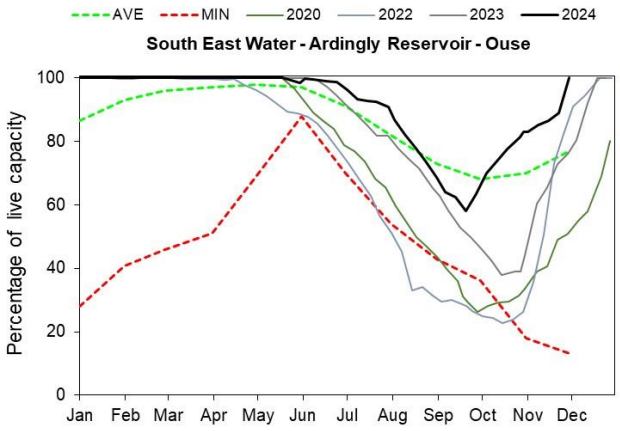
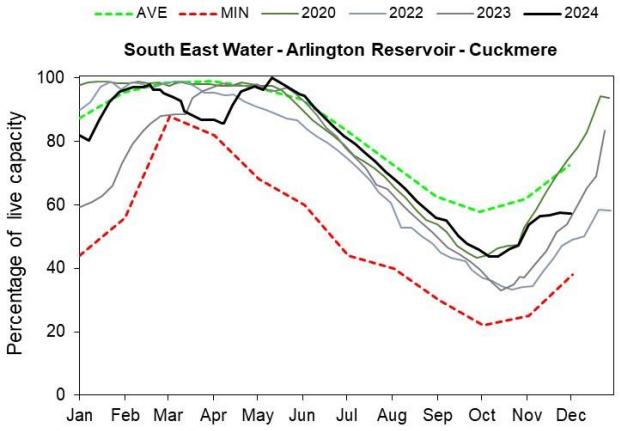


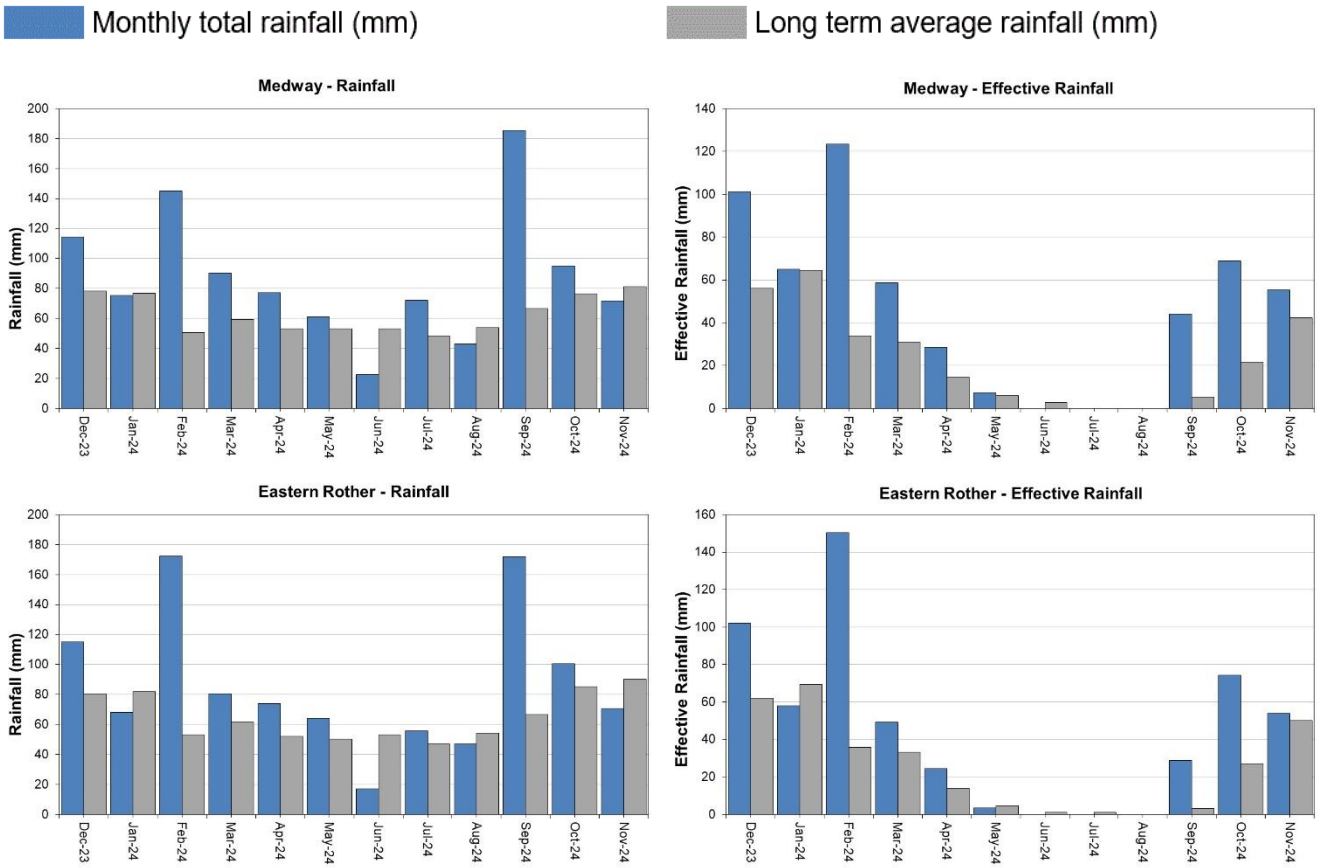


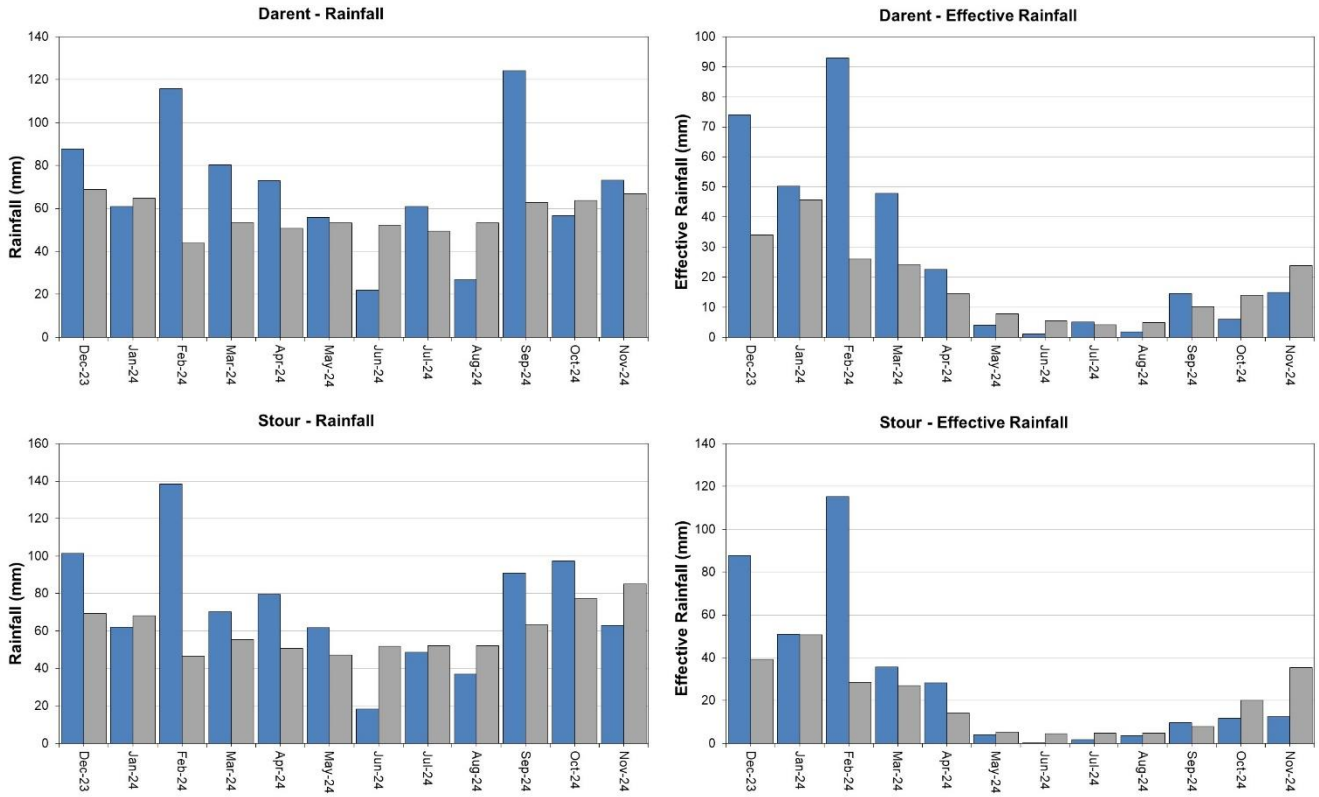
(Source: water companies).

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.



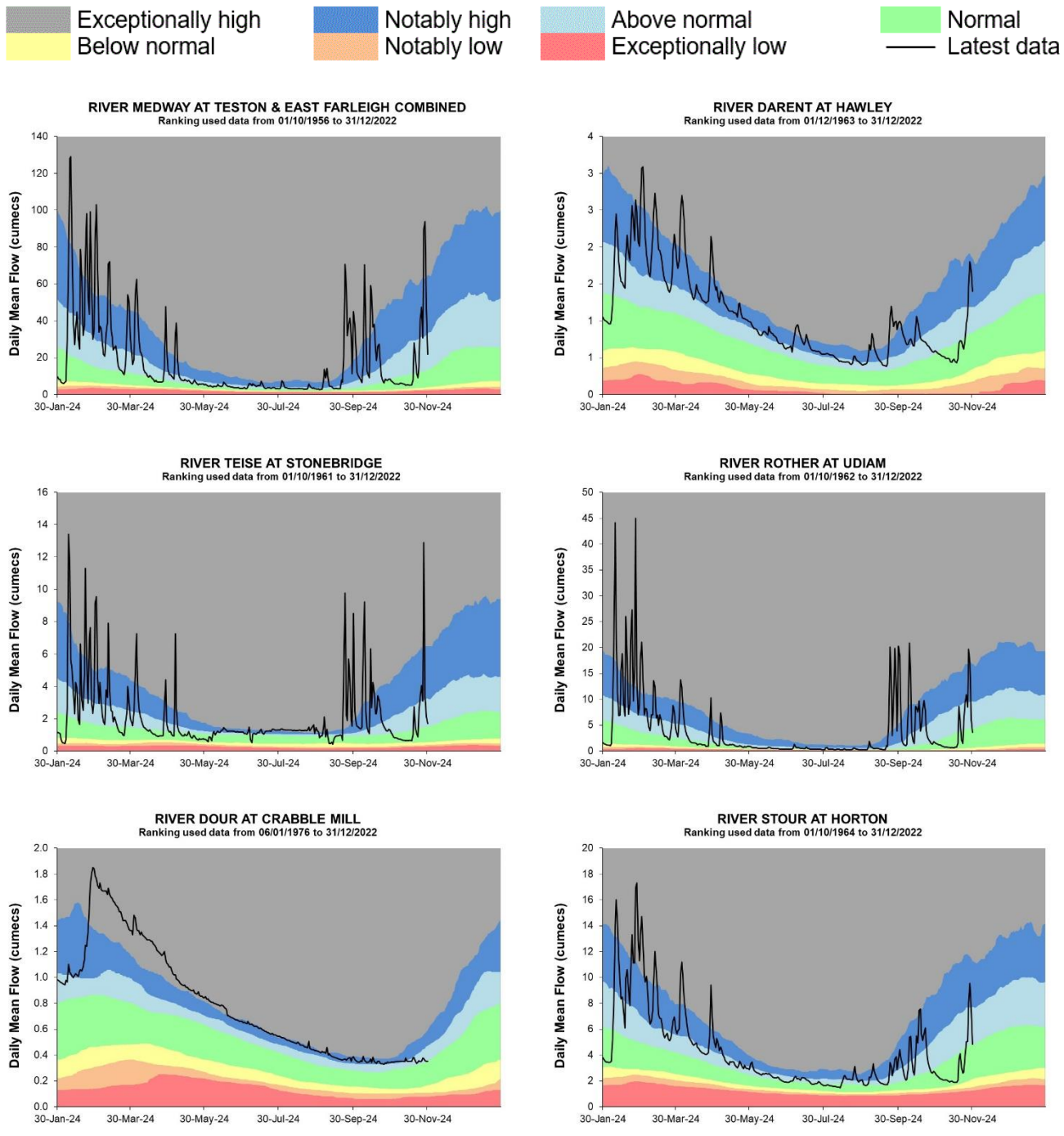


HadUK rainfall data. (Source: Met Office. Crown copyright, 2024).

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

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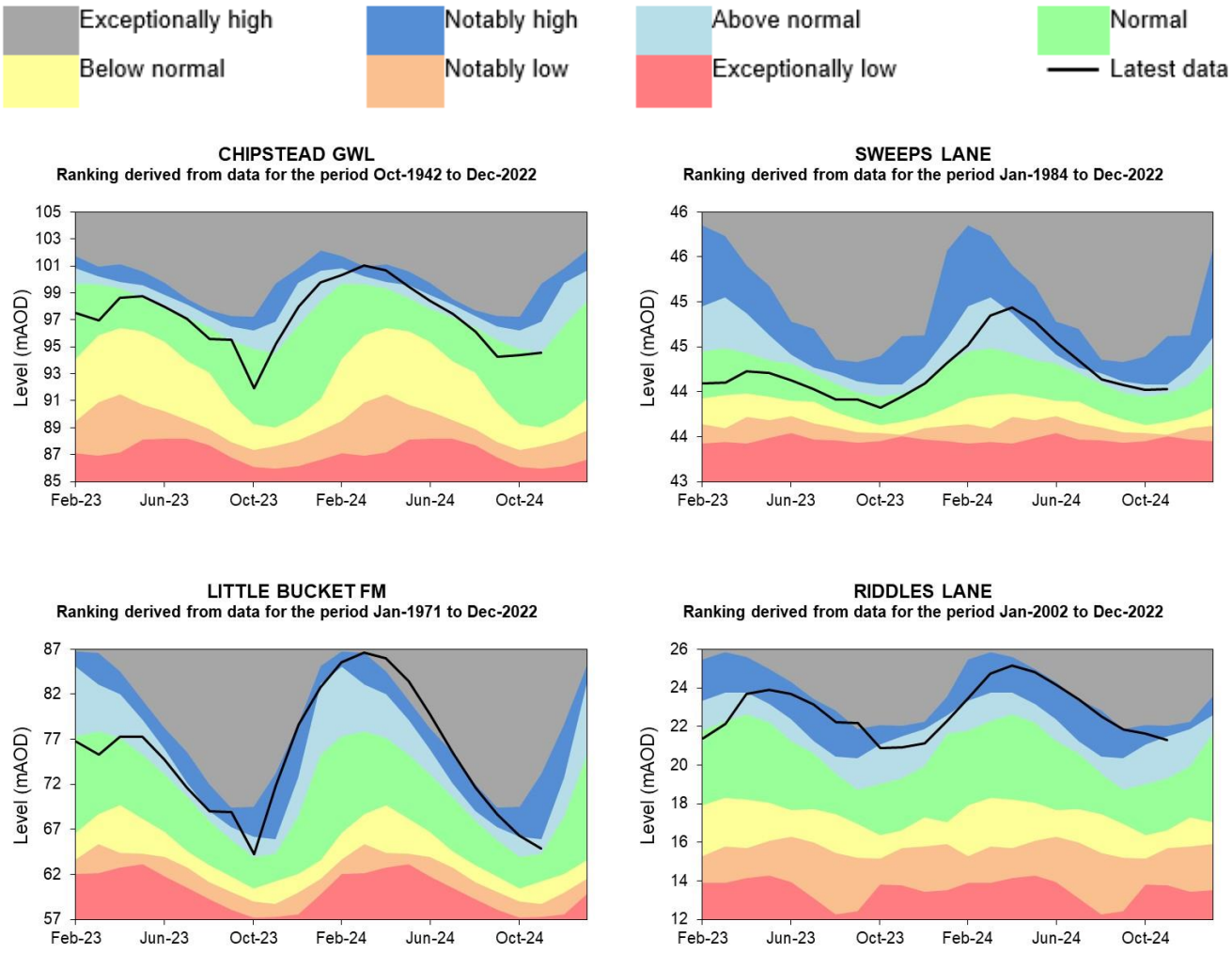

Source: Environment Agency. 2024

7.4 KSL Reservoir stocks

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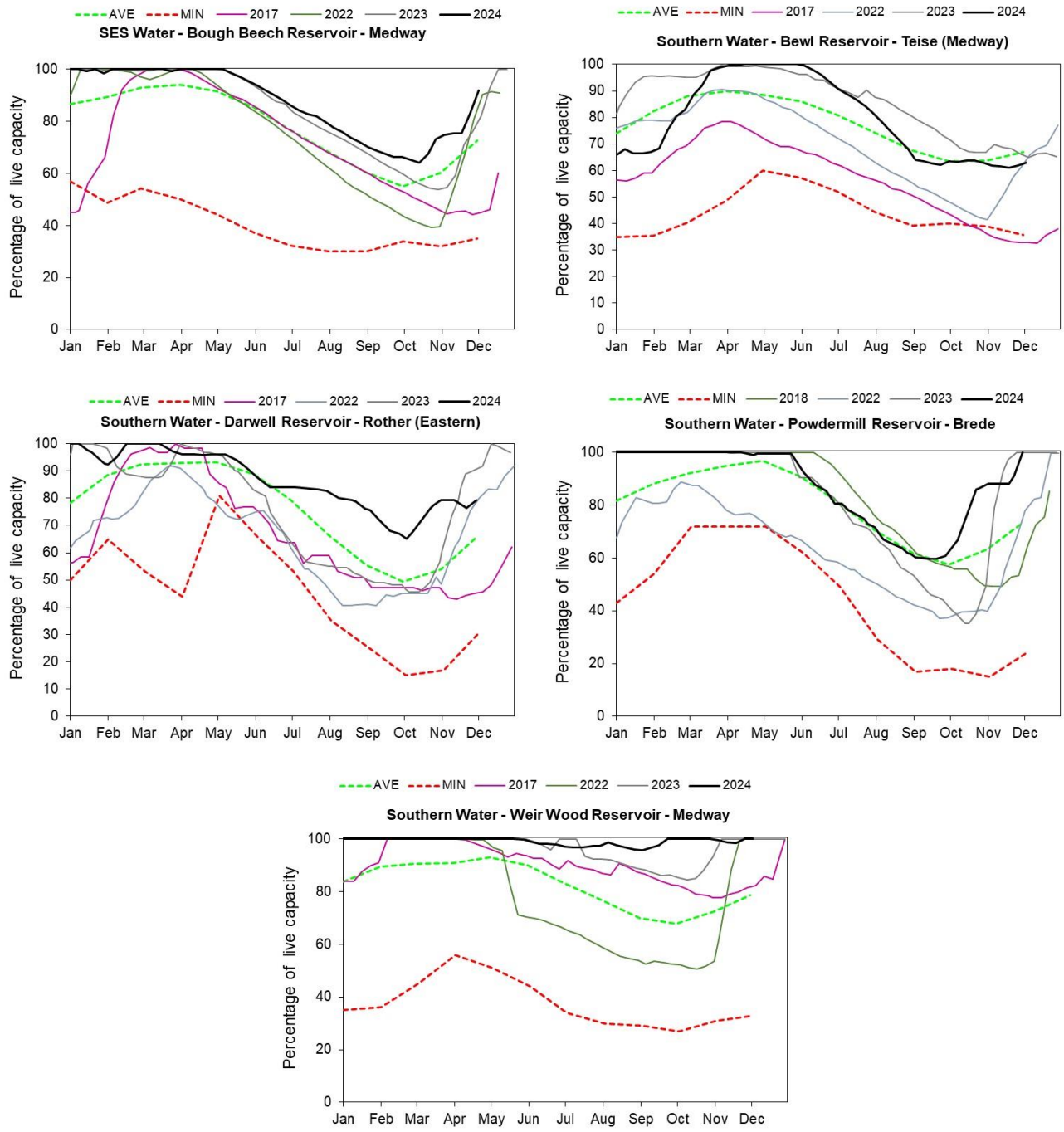

(Source: water companies).

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	Nov 2024 rainfall % of long term average 1961 to 1990	Nov 2024 band	Sep 2024 to November cumulative band	Jun 2024 to November cumulative band	Dec 2023 to November cumulative band
Cotswold West	150	Above Normal	Exceptionally high	Exceptionally high	Exceptionally high
Cotswold East	165	Above Normal	Exceptionally high	Exceptionally high	Exceptionally high
Berkshire Downs	154	Above Normal	Exceptionally high	Notably high	Exceptionally high
Chilterns West	120	Normal	Exceptionally high	Notably high	Exceptionally high
Chilterns East Colne	106	Normal	Notably high	Above normal	Exceptionally high
North Downs - Hampshire	122	Normal	Exceptionally high	Above normal	Exceptionally high
North Downs - South London	110	Normal	Notably high	Normal	Notably high
Upper Thames	157	Above Normal	Exceptionally high	Notably high	Exceptionally high
Upper Cherwell	170	Above Normal	Exceptionally high	Notably high	Exceptionally high
Thame	128	Normal	Exceptionally high	Notably high	Exceptionally high
Loddon	122	Normal	Exceptionally high	Above normal	Exceptionally high
Lower Wey	119	Normal	Exceptionally high	Above normal	Exceptionally high
Upper Mole	103	Normal	Notably high	Above normal	Exceptionally high
Lower Lee	99	Normal	Above normal	Normal	Notably high
North London	104	Normal	Notably high	Normal	Notably high
South London	110	Normal	Notably high	Normal	Notably high
Roding	95	Normal	Normal	Normal	Notably high

Ock	152	Above Normal	Exceptionally high	Notably high	Exceptionally high
Enborne	143	Above Normal	Exceptionally high	Notably high	Exceptionally high
Cut	117	Normal	Exceptionally high	Above normal	Exceptionally high
Lee Chalk	92	Normal	Exceptionally high	Above normal	Exceptionally high
River Test	140	Above Normal	Exceptionally high	Notably high	Exceptionally high
East Hampshire Chalk	124	Normal	Notably high	Above normal	Exceptionally high
West Sussex Chalk	96	Normal	Notably high	Above normal	Exceptionally high
East Sussex Chalk	80	Normal	Notably high	Above normal	Exceptionally high
Sw Isle Of Wight	120	Normal	Notably high	Above normal	Exceptionally high
River Darent	110	Normal	Above normal	Normal	Notably high
North Kent Chalk	85	Normal	Above normal	Normal	Notably high
Stour	74	Normal	Normal	Normal	Above normal
Dover Chalk	74	Normal	Normal	Normal	Notably high
Thanet Chalk	70	Normal	Normal	Notably low	Normal
Western Rother Greensand	110	Normal	Above normal	Normal	Exceptionally high
Hampshire Tertiaries	122	Normal	Notably high	Above normal	Exceptionally high
Lymington River Avon Water And O	121	Normal	Notably high	Above normal	Exceptionally high
Sussex Coast	94	Normal	Above normal	Normal	Exceptionally high
River Arun	110	Normal	Notably high	Above normal	Exceptionally high
River Adur	87	Normal	Notably high	Normal	Exceptionally high
River Ouse	84	Normal	Notably high	Above normal	Exceptionally high
Cuckmere River	77	Normal	Notably high	Above normal	Exceptionally high
Pevensey Levels	76	Normal	Notably high	Normal	Notably high

River Medway	88	Normal	Notably high	Above normal	Exceptionally high
Eastern Rother	78	Normal	Notably high	Normal	Exceptionally high
Romney Marsh	74	Normal	Above normal	Normal	Notably high
North West Grain	98	Normal	Normal	Normal	Above normal
Sheppy	80	Normal	Normal	Below normal	Above normal

9.2 River flows table

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

9.3 Groundwater table

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

9.4 South-east England areal units for reference