Monthly water situation report: Kent and South London Area

1 Summary - February 2024

The whole of the Kent and South London (KSL) area received 290% of the long-term average (LTA) rainfall during February. Rainfall received across all catchments was in the exceptionally high category seeing some rainfall areas experience the wettest and close to wettest month on record. At the end of February, soil moisture deficits (SMDs) throughout all thirteen of the rainfall areas ended the month with 0mm SMD. Monthly mean river flows (MMFs) for February ranged from above normal to exceptionally high. At the end of February 2024, groundwater levels in the Chalk and Lower Greensand aquifers ranged from above normal to exceptionally high across the KSL area. Levels at the five water company reservoirs ranged from below normal to above normal.

1.1 Rainfall

The whole of the Kent and South London (KSL) area received 290% of the long-term average (LTA) rainfall during February. All rainfall areas recorded rainfall totals within the exceptionally high category, receiving at least 260% of the long-term average for February. This month saw many rainfall areas in KSL receive record breaking rainfall. The Dover Chalk area received the wettest February, with Eastern Rother having the second wettest since records began in 1910. It was the third wettest on record for 4 rainfall areas in the centre of the patch, North West Grain, Medway, Stour and North Kent Chalk. The highest daily rainfall total of 37.8mm occurred on the twenty-fifth day of the month and was recorded at Brede PS tipping bucket rain gauge in the Eastern Rother catchment. Days 6, 8, 17 and 29 had the next highest daily rainfall totals that ranged from 20.6mm to 35mm. During the previous three months, which spanned from December to February, rainfall was notably high in eleven out of thirteen catchments in the KSL area. Two of the thirteen catchments in the south fell within the exceptionally high rainfall category. In the previous 6 months, spanning September to February, rainfall across the KSL area was exceptionally high in catchments in the south and above normal to notably high in catchments in the north. The last twelve months saw rainfall that was exceptionally high across much of the KSL area with some catchments in the north falling within the notably high category.

1.2 Soil moisture deficit and recharge

At the end of February, soil moisture deficits (SMDs) throughout all thirteen of the rainfall areas in KSL had a minimal decrease compared to January and ended the month with 0mm SMD. This is consistent with the high amount of effective rainfall KSL received this month. Aquifers continue to remain highly responsive, and depending on their intensity, rainfall events are resulting in groundwater levels rising after relatively short time periods.

1.3 River flows

Monthly mean river flows (MMFs) for February ranged from above normal in the northwest of KSL area to notably high and exceptionally high moving east through the patch. Flows peaked in response to heavy rainfall across all catchments. The key flow site with the highest percentage of LTA monthly mean river flow was the Rother at Udiam, which saw 301% of the LTA for the month of February. The lowest percentage of LTA monthly mean river flow was observed at the Wandle at Connollys Mill, which recorded 128% of the LTA.

1.4 Groundwater levels

At the end of February 2024, groundwater levels in the Chalk and Lower Greensand aquifers ranged from above normal to exceptionally high across the KSL area. Groundwater levels were above normal in the chalk in the northwest at Chipstead and Sweeps Lane, while levels were notably high in the Greensand at Riverhead and in the chalk at Riddles Lane and Little Bucket. Wolverton was the only groundwater site to record levels that were exceptionally high in February. Due to the continued above average effective rainfall and very low SMDs across the KSL area during the last months, groundwater levels in the Chalk and Lower Greensand aquifers continued to rise in February.

The aquifers continue to be highly responsive as indicated above and spells of heavy, intensive rainfall have the potential for groundwater to rise more rapidly within relatively short time periods. Therefore, we are monitoring the situation closely and we are advising on the likelihood of groundwater flooding to occur in the KSL area as part of groundwater situation reports. After the start of the recharge season, we typically issue these reports on a fortnightly or monthly basis.

1.5 Reservoir stocks

At the end of February, levels at the five water company reservoirs in the KSL area ranged from below normal to notably high. Levels at Bewl were below normal in February at 86% of live capacity due to planned operational works. Levels at Darwell and Bough Beech reservoirs were above notably high for this time of the year with 100% live capacity. Levels at Weir Wood and Powdermill reservoirs, which both had a live capacity of 100% at the end of the month, were above normal for this time of year.

1.6 Environmental impact

Twelve flood warnings were issued for fluvial flooding on 9, 26, 28 and 29 February at the River Mole, New Romney sewage arm East Stour from Sellinge to Ashford and Grove Ferry and Plucks Gutter. Two hundred and nineteen fluvial flood alerts were issued in February 2024. Groundwater flooding alerts in East Kent were updated on 2 and 9 of February.

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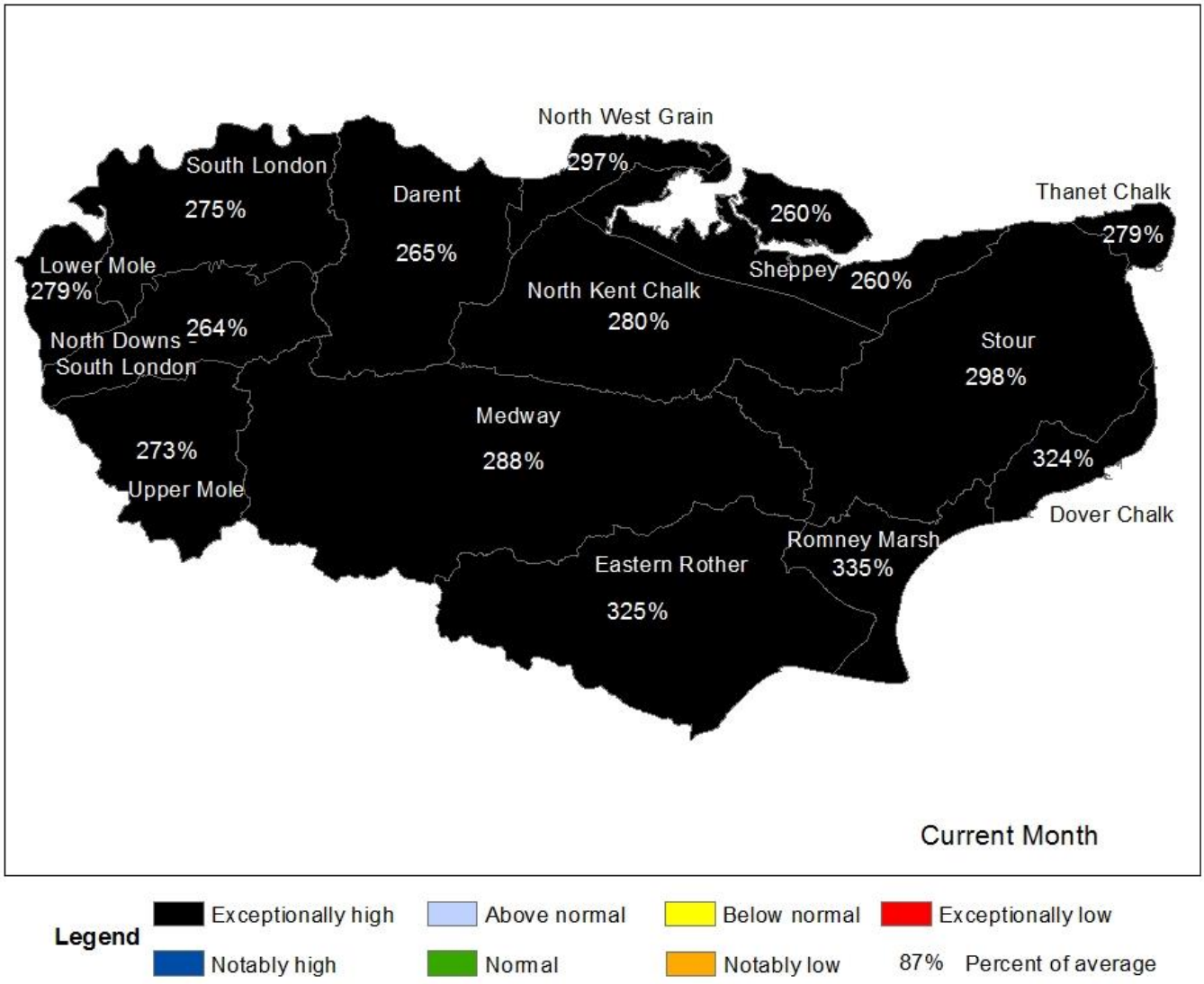
2 Rainfall

2.1 Rainfall map one

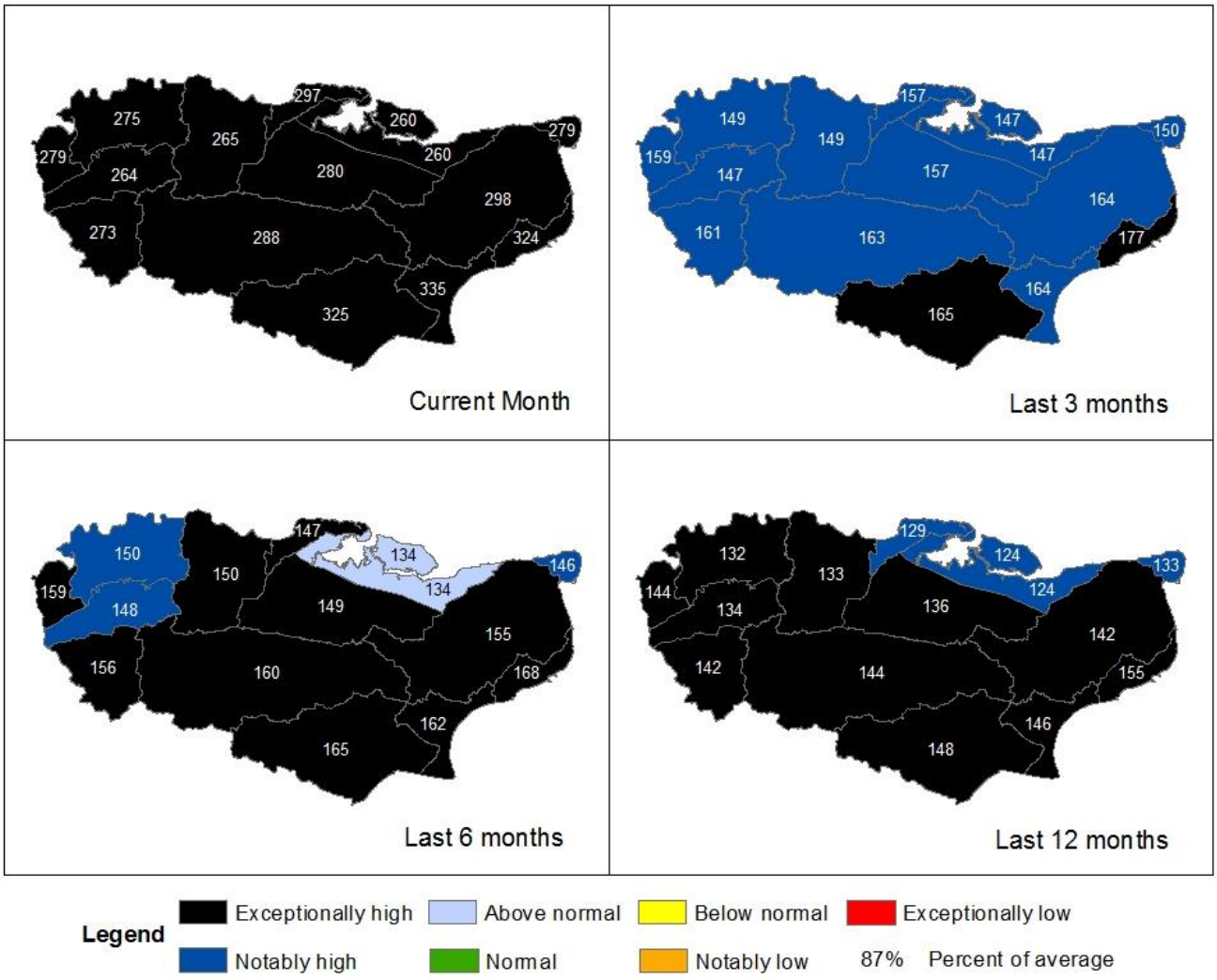
Figure 2.1: Total rainfall for hydrological areas across Kent and South London for the current month (up to 29 February 2024), classed relative to an analysis of respective historic totals. Table available in the appendices with more detailed information.



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. Includes material based on Ordnance Survey 1:50 000 maps with the permission of the controller of His Majesty's Stationery Office © Crown copyright. All rights reserved. Environment Agency, 100026380, 2024.

2.2 Rainfall map two

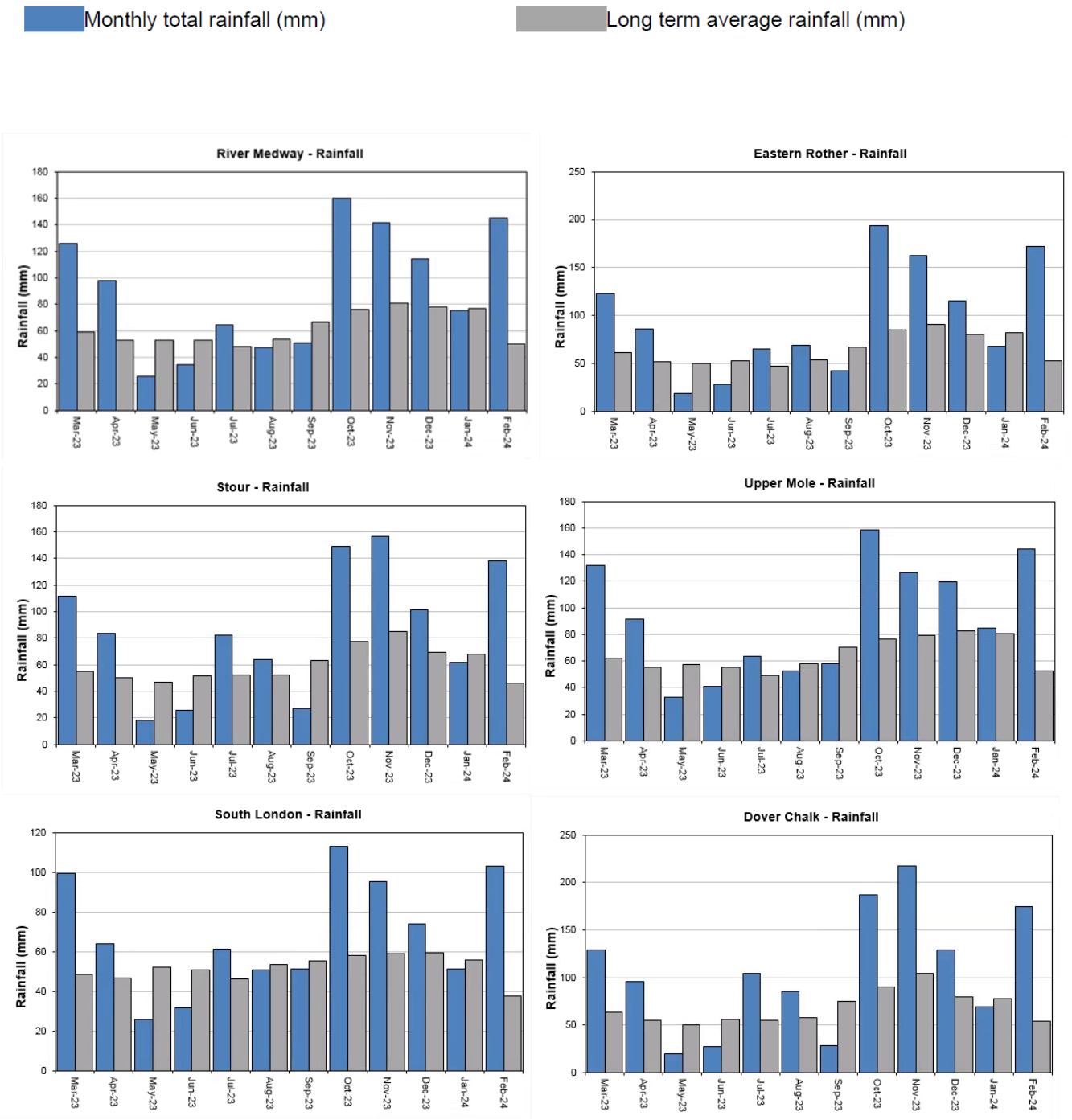
Figure 2.2: Total rainfall for hydrological areas for the current month (up to 29 February 2024), the last 3 months, the last 6 months, and the last 12 months, classed relative to an analysis of respective historic totals. Table available in the appendices with detailed information.

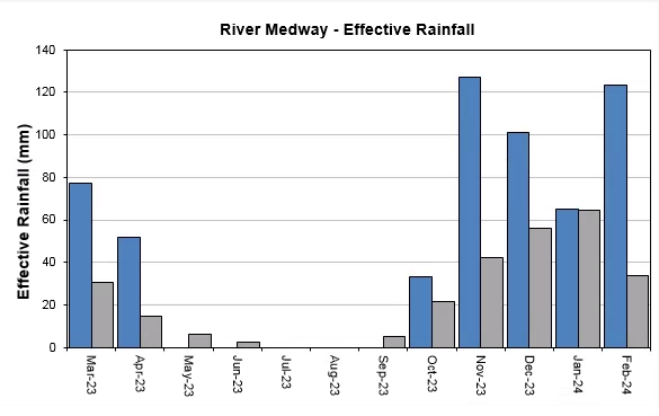


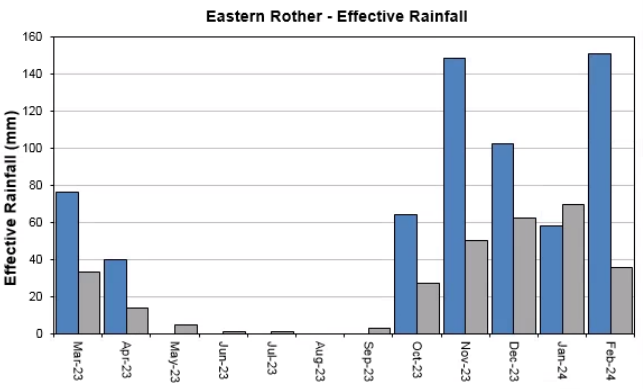
HadUK data based on the Met Office 1km gridded rainfall dataset derived from rain gauges (Source: Met Office. Crown copyright, 2024). Provisional data based on Environment Agency 1km gridded rainfall dataset derived from Environment Agency intensity rain gauges. Includes material based on Ordnance Survey 1:50 000 maps with the permission of the controller of His Majesty's Stationery Office © Crown copyright. All rights reserved. Environment Agency, 100026380, 2024.

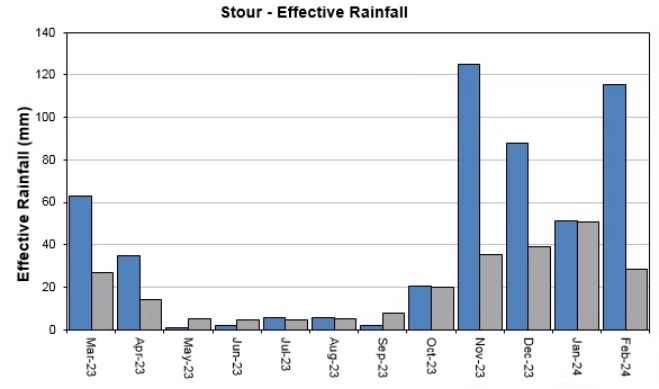
2.3 Rainfall and effective rainfall charts

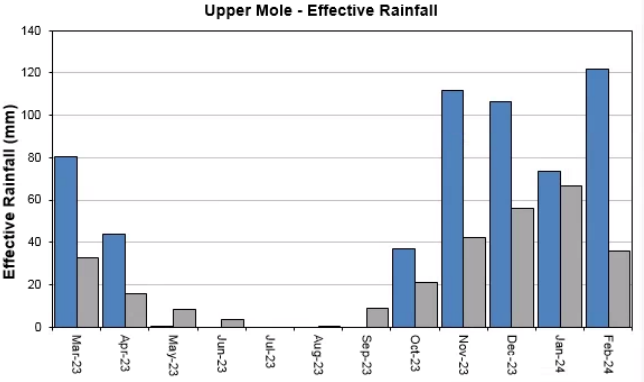
Figure 2.3: : Monthly rainfall and effective rainfall totals for the past 12 months as a percentage of the 1961 to 1990 long term average (LTA) for a selection of areal units. HadUK rainfall data. (Source: Met Office. Crown copyright, 2024). EA effective rainfall data (Source EA Soil Moisture Model).

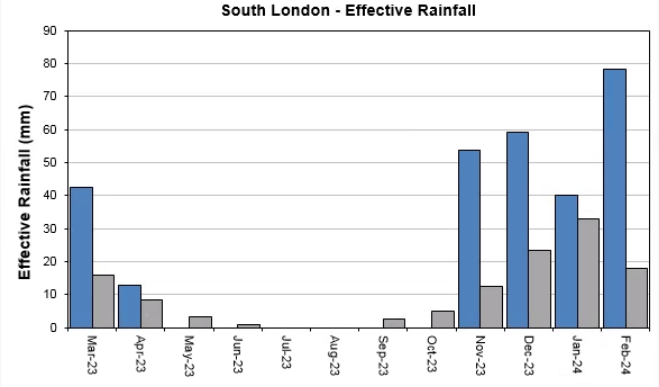


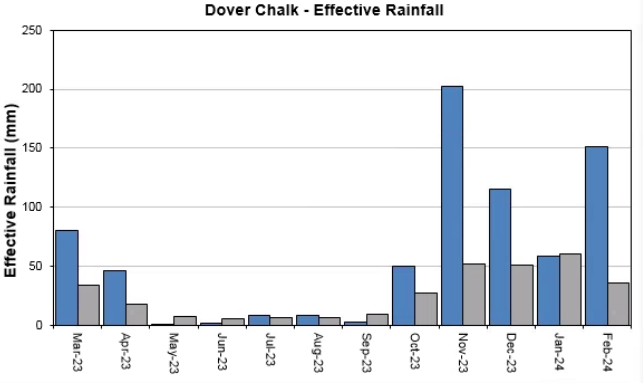

River Medway - Effective Rainfall
Effective Rainfall (mm)
0
20
40
60
80
100
120
140
Mar-23
Apr-23
May-23
Jun-23
Jul-23
Aug-23
Sep-23
Oct-23
Nov-23
Dec-23
Jan-24
Feb-24


Eastern Rother - Effective Rainfall
Effective Rainfall (mm)
0
20
40
60
80
100
120
140
160
Mar-23
Apr-23
May-23
Jun-23
Jul-23
Aug-23
Sep-23
Oct-23
Nov-23
Dec-23
Jan-24
Feb-24


Stour - Effective Rainfall
Effective Rainfall (mm)
0
20
40
60
80
100
120
140
Mar-23
Apr-23
May-23
Jun-23
Jul-23
Aug-23
Sep-23
Oct-23
Nov-23
Dec-23
Jan-24
Feb-24


Upper Mole - Effective Rainfall
Effective Rainfall (mm)
0
20
40
60
80
100
120
140
Mar-23
Apr-23
May-23
Jun-23
Jul-23
Aug-23
Sep-23
Oct-23
Nov-23
Dec-23
Jan-24
Feb-24


South London - Effective Rainfall
Effective Rainfall (mm)
0
10
20
30
40
50
60
70
80
90
Mar-23
Apr-23
May-23
Jun-23
Jul-23
Aug-23
Sep-23
Oct-23
Nov-23
Dec-23
Jan-24
Feb-24


Dover Chalk - Effective Rainfall
Effective Rainfall (mm)
0
50
100
150
200
250
Mar-23
Apr-23
May-23
Jun-23
Jul-23
Aug-23
Sep-23
Oct-23
Nov-23
Dec-23
Jan-24
Feb-24

2.4 Rainfall and effective rainfall table

Figure 2.4: This is a second estimate of areal rainfall and effective rainfall (percolation or runoff) for a selection of the hydrological areas across the Kent and South London area. 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 section 2.5.

Number	Hydrological Area	Rainfall (mm) 29 day Total	February% LTA	Effective Rainfall (mm) 29 day Total	February % LTA
6230TH	North Downs - South London (W)	132	263%	110	325%
6505TH	Upper Mole	145	274%	122	339%
6508TH	South London	103	274%	78	>400%
6706So	Darent	116	265%	93	357%
6707So	North Kent Chalk	129	280%	106	374%
6708So	Stour	138	297%	115	>400%
6709So	Dover Chalk	175	325%	151	>400%
6710So	Thanet Chalk	90	276%	64	>400%
6809So	Medway	145	288%	123	363%
6810So	Eastern Rother	172	326%	151	>400%

6811So	Romney Marsh	142	335%	119	>400%
6812So	North West Grain	99	296%	75	>400%
6813So	Sheppey	95	260%	70	>400%
	Kent & South London Average	129	290%	106	405%

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

EA effective rainfall data (Source EA Soil Moisture Model)

2.5 Seasonal summary table of rainfall and effective rainfall

Figure 2.5: This is a seasonal estimate of areal rainfall and effective rainfall (percolation or runoff) for a selection of the hydrological areas across the Kent and South London area, 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.

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

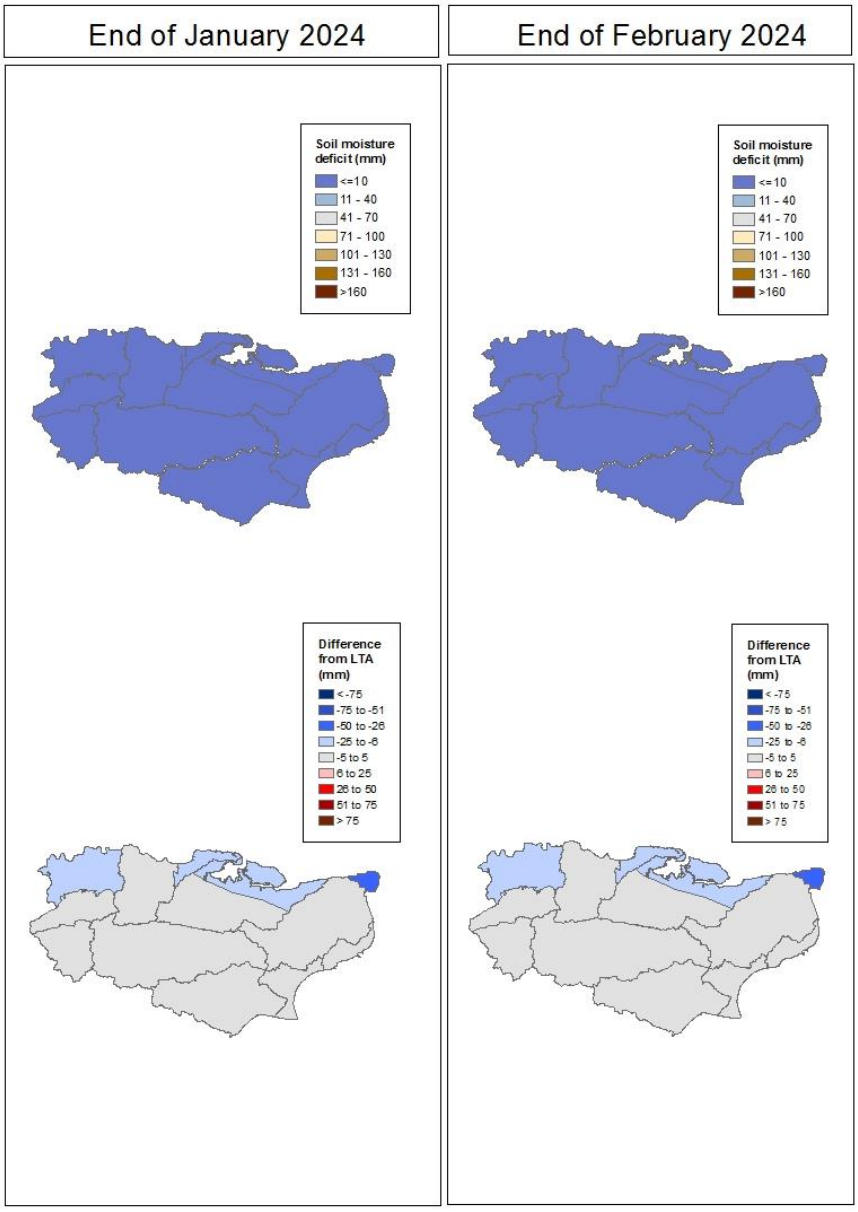
Number	Hydrological Area	Seasonal Rainfall (mm) Total	% LTA	Seasonal Effective Rainfall (mm) Total	% LTA
6230TH	North Downs - South London (W)	563	158%	378	188%
6505TH	Upper Mole	633	170%	451	203%
6508TH	South London	436	161%	231	251%
6706So	Darent	509	166%	299	208%
6707So	North Kent Chalk	540	165%	333	202%
6708So	Stour	607	175%	399	229%
6709So	Dover Chalk	778	193%	576	255%
6710So	Thanet Chalk	452	169%	195	337%
6809So	Medway	636	175%	450	206%
6810So	Eastern Rother	711	182%	523	214%

6811So	Romney Marsh	615	184%	407	245%
6812So	North West Grain	406	167%	175	292%
6813So	Sheppey	391	151%	161	236%
	Kent & South London Average	560	172%	352	225%

3 Soil moisture deficit

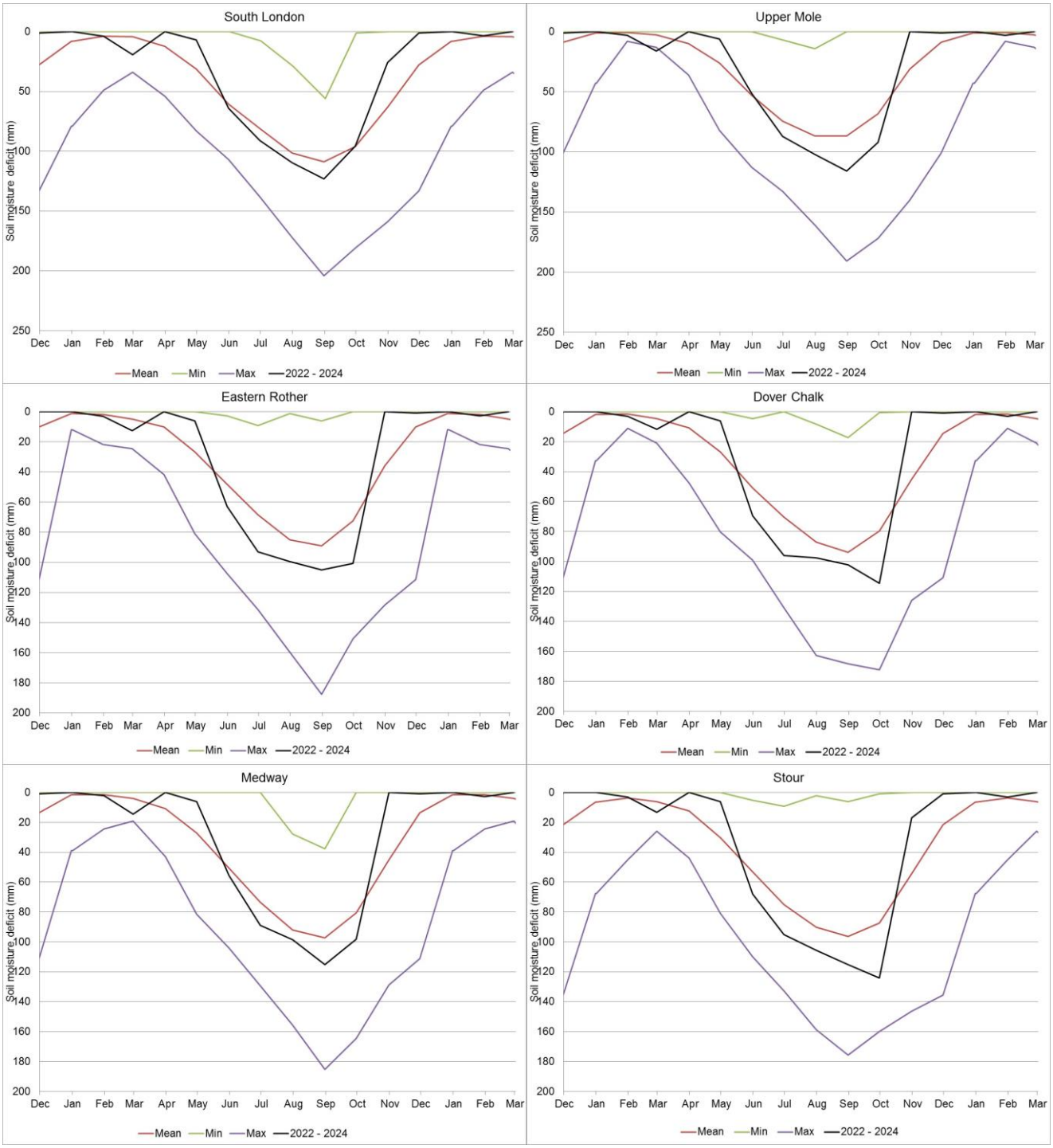
3.1 Soil moisture deficit map

Figure 3.1: Soil moisture deficits for weeks ending 31 January (left panel) and 29 February 2024 (right panel). Top row shows actual soil moisture deficits (mm) and bottom row shows the difference (mm) of the actual from the 1961 to 90 long term average soil moisture deficits. EA Soil Moisture Deficit data (Source EA Soil Moisture Model).



3.2 Soil moisture deficit charts

Figure 3.2: Latest soil moisture deficit compared to maximum, minimum, and 1961 to 1990 long term average. EA soil moisture deficit data (Source EA Soil Moisture Model).



3.3 Soil moisture deficit table

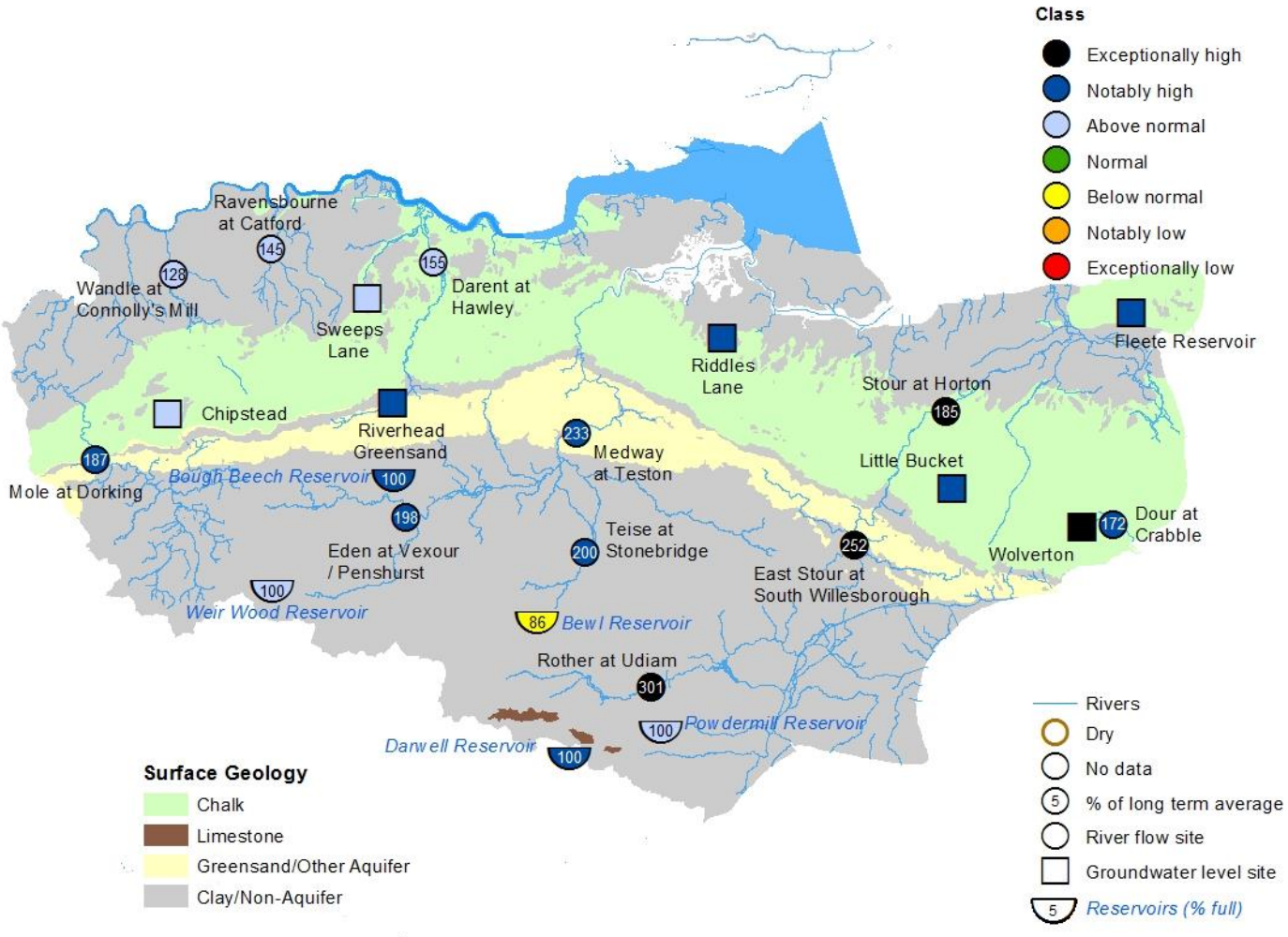
Figure 3.3: This is a second estimate of soil moisture deficit for the hydrological areas across the Kent and South London area. There may be significant variation within each area which must be considered when interpreting these data. EA soil moisture deficit data (Source EA Soil Moisture Model).

Number	Hydrological Area	SMD (mm) Day 29	End February LTA
6230TH	North Downs - South London (W)	0	3
6505TH	Upper Mole	0	2
6508TH	South London	0	7
6706So	Darent	0	4
6707So	North Kent Chalk	0	4
6708So	Stour	0	3
6709So	Dover Chalk	0	3
6710So	Thanet Chalk	0	42
6809So	Medway	0	2
6810So	Eastern Rother	0	3
6811So	Romney Marsh	0	4
6812So	North West Grain	0	11
6813So	Sheppey	0	9
	Kent & South London Average	0	8

4 River flows, groundwater levels and reservoir stocks

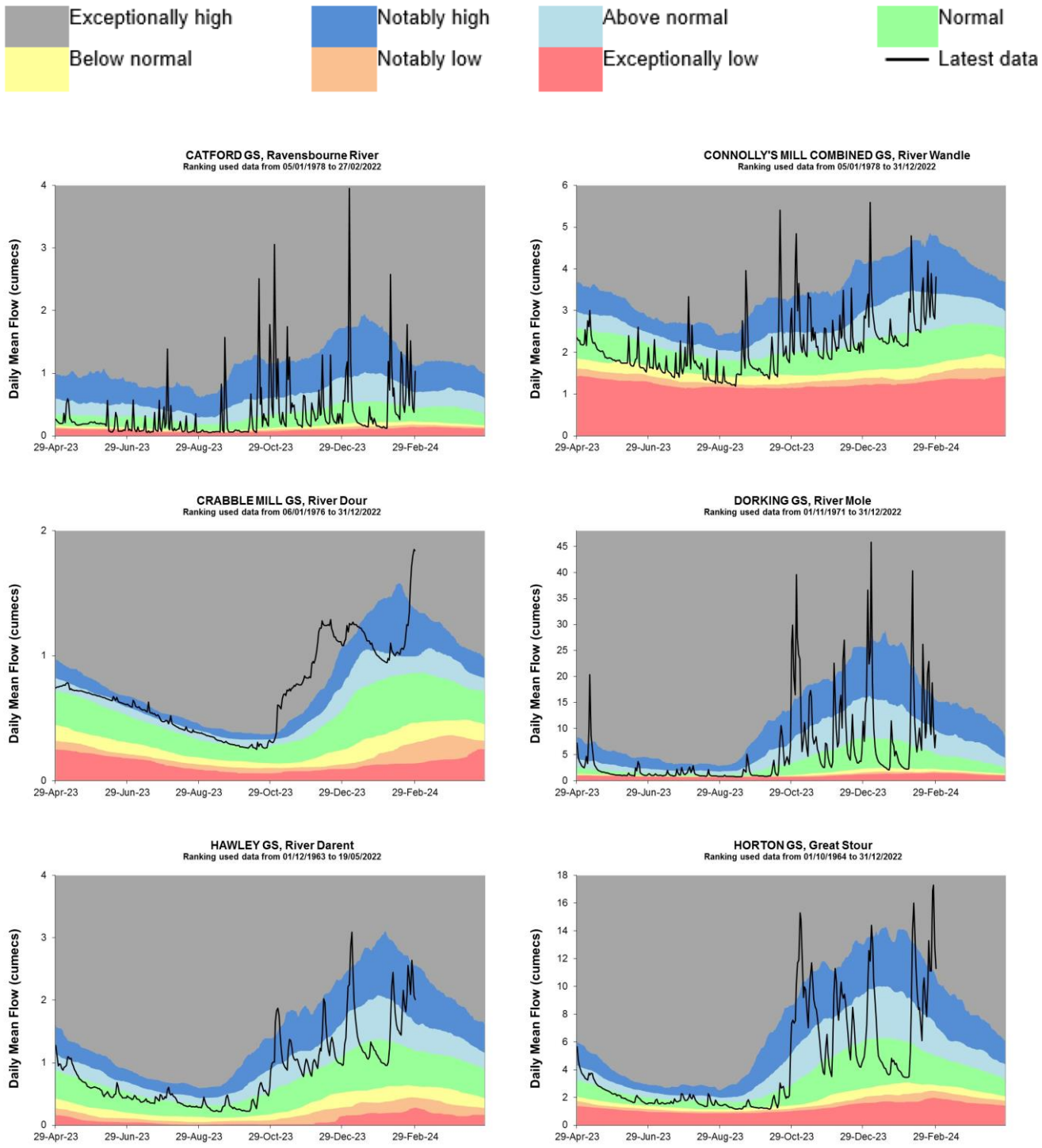
4.1 River flows, groundwater levels and reservoir stocks map

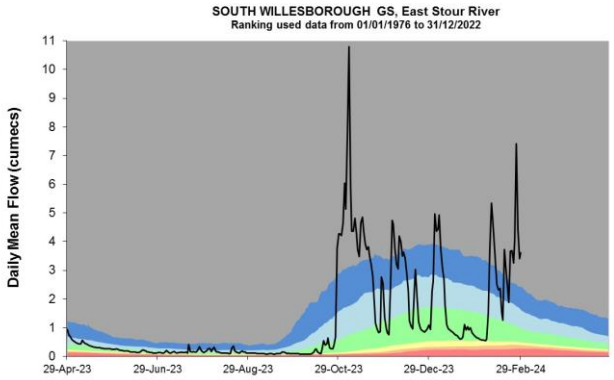
Figure 4.1: Monthly mean river flows for indicator sites for February 2024, expressed as a percentage of the respective long term average and classed relative to an analysis of historic February monthly means. End of month groundwater levels for indicator sites for February 2024, expressed as a percentage of the respective long term average and classed relative to an analysis of historic February levels. Tables available in the appendices with detailed information. End of month levels for reservoirs for February 2024, expressed as percent full. (Source: Water Companies).

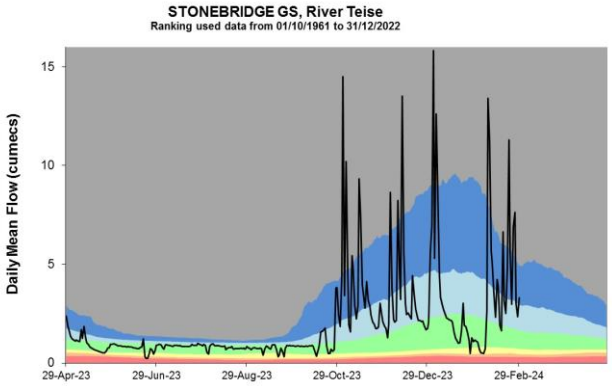


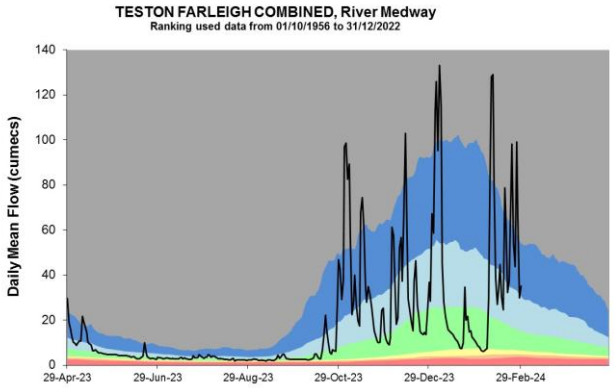
4.2 River flow charts

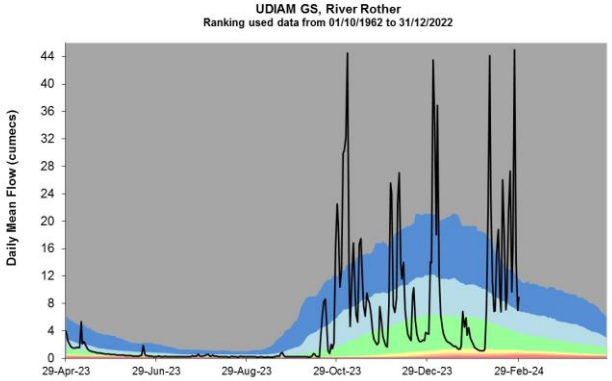
Figure 4.1: Daily mean river flow for index sites over the past year, compared to an analysis of historic daily mean flows, and long term maximum and minimum flows.

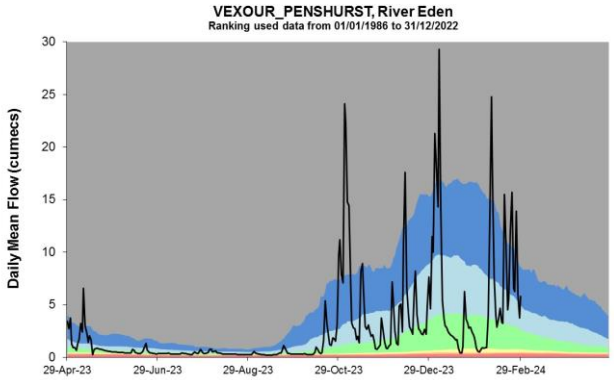










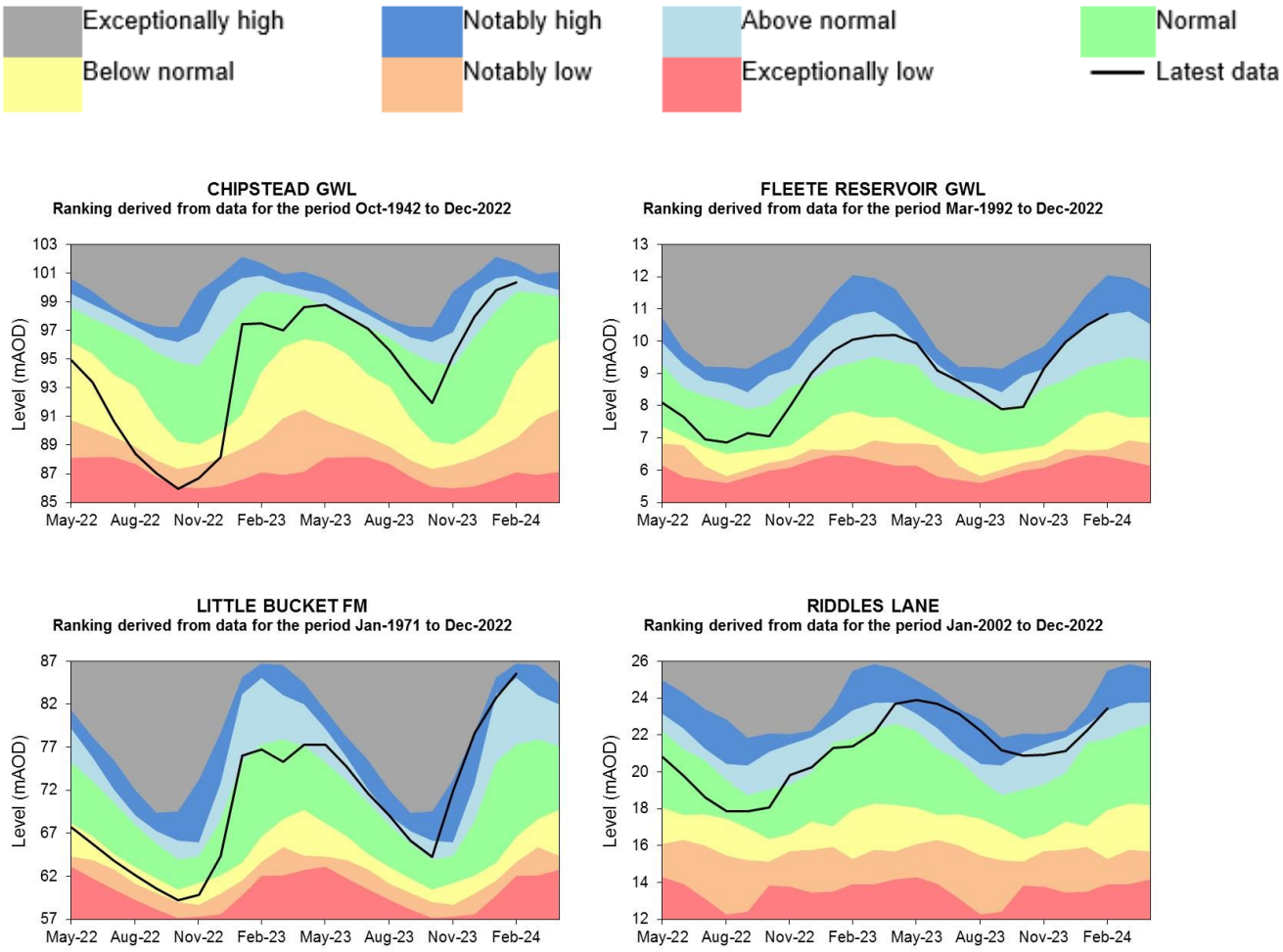


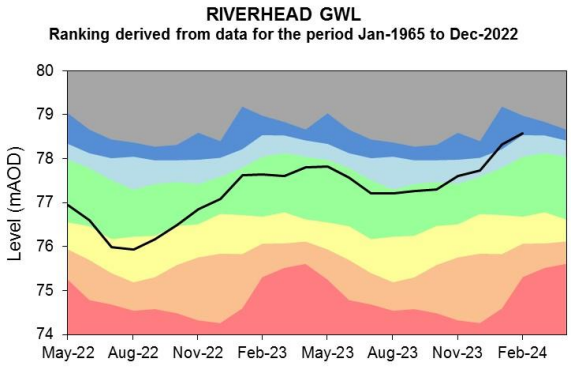
Source: Environment Agency.

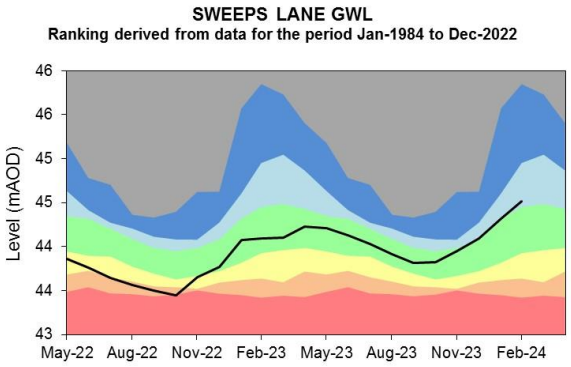
5 Groundwater levels

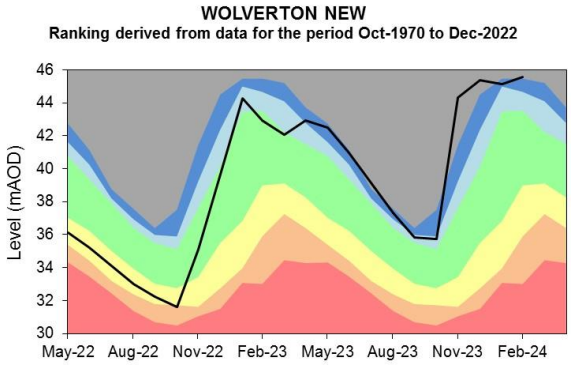
5.1 Groundwater level charts

Figure 5.1: 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.







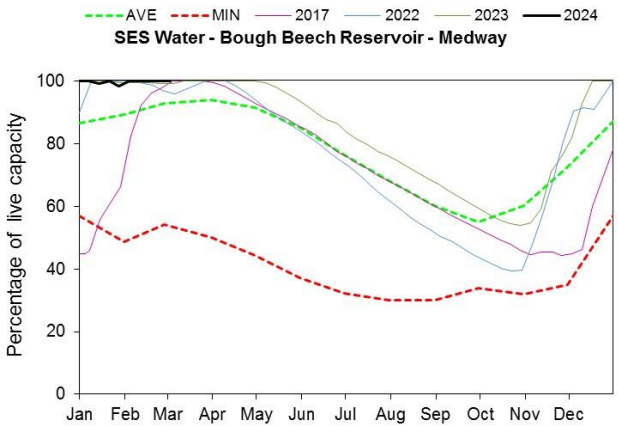


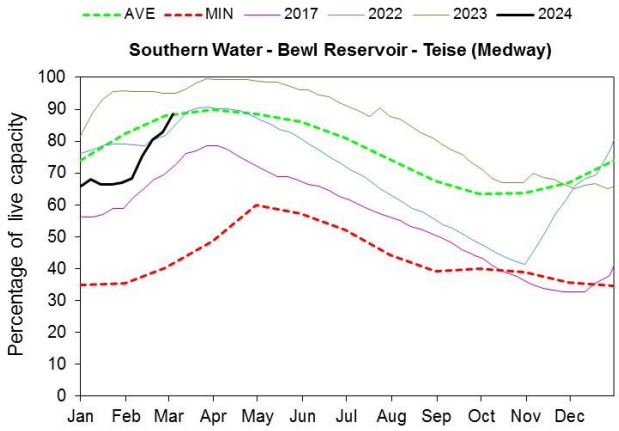
Source: Environment Agency, 2024.

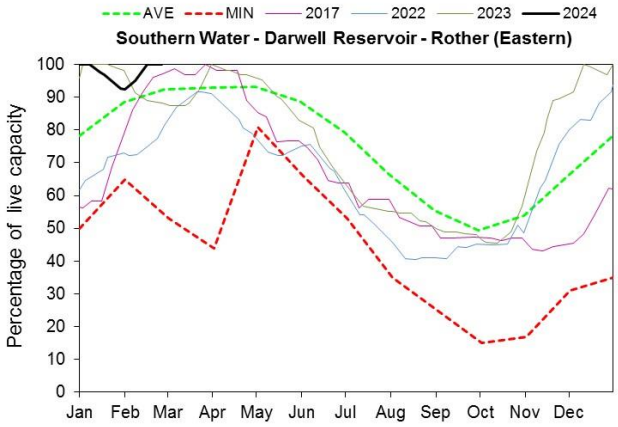
6 Reservoir stocks

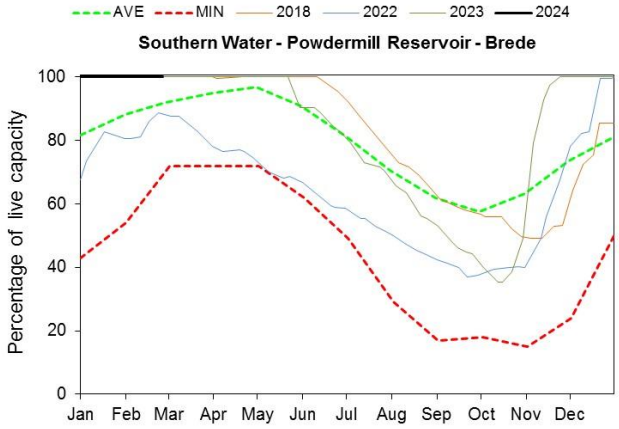
6.1 Reservoir stocks charts

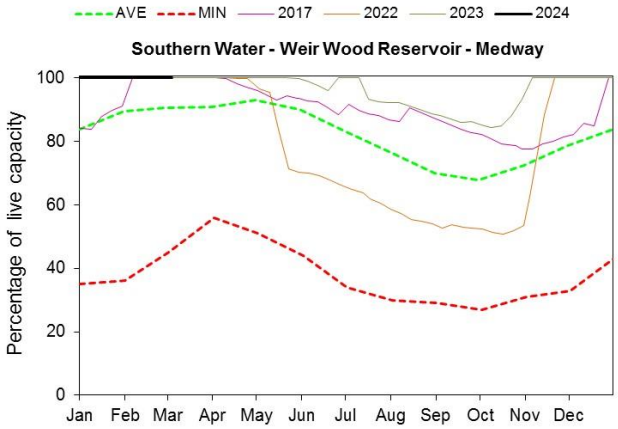
Figure 7.1: End of month regional reservoir stocks compared to long term maximum, minimum and average stocks. (Source: Water Companies). Note: Historic records of individual reservoirs and reservoir groups making up the regional values vary in length.











7 Glossary

7.1 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).

7.2 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.

8 Appendices

8.1 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
North Downs - South London	264	Exceptionally High	Notably high	Notably high	Exceptionally high
Upper Mole	274	Exceptionally High	Notably high	Exceptionally high	Exceptionally high
South London	275	Exceptionally High	Notably high	Notably high	Exceptionally high
River Darent	265	Exceptionally High	Notably high	Exceptionally high	Exceptionally high
North Kent Chalk	280	Exceptionally High	Notably high	Exceptionally high	Exceptionally high
Stour	298	Exceptionally High	Notably high	Exceptionally high	Exceptionally high
Dover Chalk	324	Exceptionally High	Exceptionally high	Exceptionally high	Exceptionally high
Thanet Chalk	279	Exceptionally High	Notably high	Notably high	Notably high
River Medway	288	Exceptionally High	Notably high	Exceptionally high	Exceptionally high

Eastern Rother	325	Exceptionally High	Exceptionally high	Exceptionally high	Exceptionally high
Romney Marsh	335	Exceptionally High	Notably high	Exceptionally high	Exceptionally high
North West Grain	297	Exceptionally High	Notably high	Exceptionally high	Notably high
Sheppy	261	Exceptionally High	Notably high	Above normal	Notably high

8.2 River flows table

Site name	River	Catchment	Feb 2024 band	Jan 2024 band
Catford Gs	River Ravensbourne	Ravensbourne	Above normal	Normal
Connolly's Mill Combined Gs	River Wandle	Wandle	Above normal	Above normal
Crabble Mill Gs	River Dour	Dour	Notably high	Notably high
Dorking Gs	River Mole	Mole Surrey	Notably high	Normal
Hawley Gs	River Darent and Cray	Darent and Cray	Above normal	Above normal
Horton Gs	Great Stour River	Great Stour	Exceptionally high	Normal
South Willesborough Gs	East Stour River	East Stour	Exceptionally high	Normal
Stonebridge Gs	River Teise	Teise	Notably high	Normal
Teston Farleigh Combined	River Medway	Medway (Middle)	Notably high	Above normal
Udiam Gs	River Rother	Rother (Kent)	Exceptionally high	Above normal
Vexour_penshurst	River Eden	Eden (Kent)	Notably high	Normal

8.3 Groundwater table

Site name	Aquifer	End of Feb 2024 band	End of Jan 2024 band
Fleete Reservoir Gwl	Isle Of Thanet Chalk	Notably high	Above normal
Chipstead Gwl	Epsom North Downs Chalk	Above normal	Above normal
Little Bucket Fm	East Kent Chalk - Stour	Notably high	Above normal
Riddles Lane	North Kent Swale Chalk	Notably high	Above normal
Riverhead Gwl	Kent Greensand	Notably high	Notably high
Sweeps Lane Gwl	West Kent Chalk	Above normal	Above normal
Wolverton New	East Kent Chalk - Stour	Exceptionally high	Notably high