Monthly water situation report: Kent and South London Area

1 Summary - March 2024

The whole of the Kent and South London area received 140% of the long-term average rainfall during March. Rainfall received across catchments in the area ranged from above normal to notably high for this time of the year. At the end of March, Kent and South London area saw the third wettest winter (October to March) on record. Soil moisture deficits throughout all thirteen of the rainfall areas were less than or equal to 10mm. Monthly mean river flows for March ranged from exceptionally high to notably high in the Kent and South London area. Groundwater levels ranged from above normal to exceptionally high in the Chalk aquifers and were exceptionally high in the Lower Greensand aquifers at Riverhead. Levels at the five water company reservoirs ranged from exceptionally high to notably high in the Kent and South London area.

1.1 Rainfall

The whole of the Kent and South London (KSL) area received 140% of the long-term average (LTA) rainfall during March. Rainfall received across catchments in the area ranged from above normal to notably high. Most catchments in the north and east of KSL received rainfall above normal, while catchments in the west received notably high amounts of rain for this time of year. The highest daily rainfall total of 20.4mm for March occurred on the tenth day of the month and was recorded at Trosley PS rain gauge in the North Kent Chalk catchment. Days 26, 12, 5 and 27 had the next highest daily rainfall totals that ranged from 15.4mm to 19.2mm. During the previous three months, which spanned from January to March, rainfall was exceptionally high in catchments in the south and notably high in catchments in the north. In the previous 6 months, spanning October to March, rainfall across the Kent and South London area was exceptionally high in all catchments except for Sheppey in the north. KSL area saw the third wettest winter since records began in 1872. The last twelve months saw rainfall that was exceptionally high in catchments in the south and notably high and above normal in catchments in the north.

1.2 Soil moisture deficit and recharge

At the end of March soil moisture deficits (SMDs) throughout all thirteen of the rainfall areas in Kent and South London were less than or equal to 10mm. SMDs were, on average, considerably wetter than the long-term average for the last day of March. SMDs had a minimal

increase compared to February. This is consistent with the amount of effective rainfall KSL received this month which was 176% of the LTA across the whole area, drier than February. 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 March ranged from notably high to exceptionally high. The latter category was seen the most during March at key flow sites, whereas only three flow sites saw notably high MMFs. These sites are in the North-West and central South of the patch. The key flow site with the highest MMF banding was the Eden at Vexour/Penshurst, which saw 261% of the LTA for the month of March. The lowest percentage of LTA monthly mean river flow was observed at the Wandle at Connollys Mill, which recorded 145% of the LTA.

1.4 Groundwater levels

Groundwater levels in March 2024 were exceptionally high in the Chalk across KSL area, except for Riddles Lane and Fleete Reservoir in the northeast where levels were notably high and Sweeps Lane in the northwest, where levels were above normal for this time of the year. Groundwater levels in the Greensand at Riverhead were exceptionally high. Due to the continued above average effective rainfall and low SMDs across the KSL area, groundwater levels in the Chalk and Lower Greensand aquifers continued to rise in March. Aquifers continue to be highly responsive, and spells of heavy, intensive rainfall would have the potential for groundwater to rise more rapidly, within relatively short time periods.

Due to the rise in groundwater levels in East Surrey and South London that occurred since February, a flood alert for groundwater flooding was issued on the 6 of March, and it is still in effect for South East London area. The flood alert for the area of East Kent issued in December 2023 is still in effect. However, during the next months, we expect periods of weather with sunnier and warmer conditions. As a result of these conditions, effective rainfall/aquifer recharge will diminish, which in turn will lead to a fall of groundwater levels until the onset of the next recharge season.

1.5 Reservoir stocks

At the end of March, reservoir levels were normal at Darwell at 96.5%, notably high at Bough Beech at 100% and above normal for this time of year at Weir Wood and Powdermill both at 100% and Bewl with a level of 99.6%. Weir Wood, Powdermill, Bough Beech were considered full at the end of the month. The levels at Bewl reservoir have recovered from the planned operational works that previously drew them down and are now above normal for this time of year. Most of the levels in the reservoirs remained unchanged throughout the month of March, however water levels in Darwell reservoir have minimally decreased.

1.6 Environmental impact

Forty-six flood alerts were issued on 1, 2, 11, 12 and 28 March. A new groundwater flooding alert was issued for South London East in March 2024 and the groundwater flooding alert for East Kent has remained in force.

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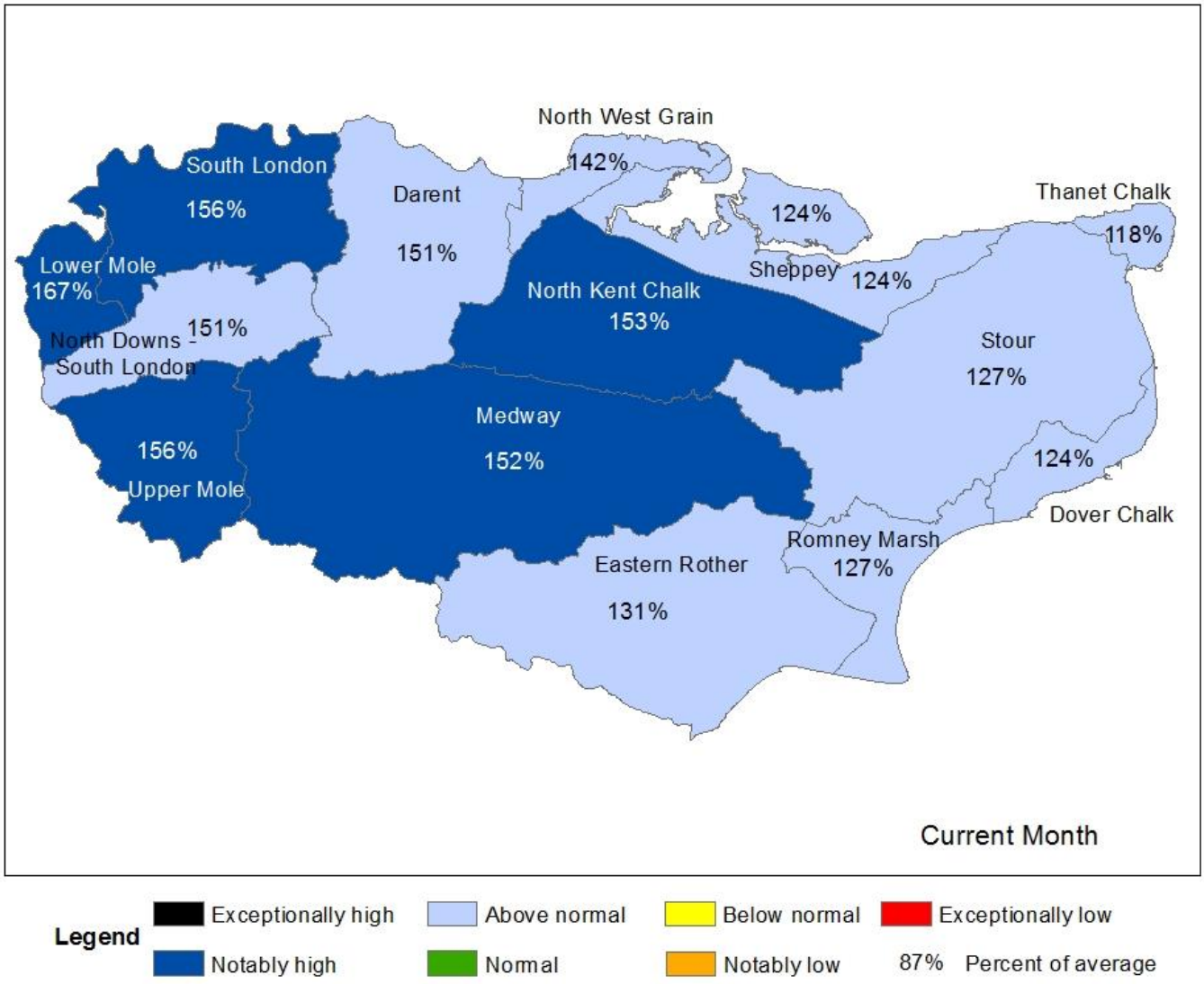
2 Rainfall

2.1 Rainfall map one

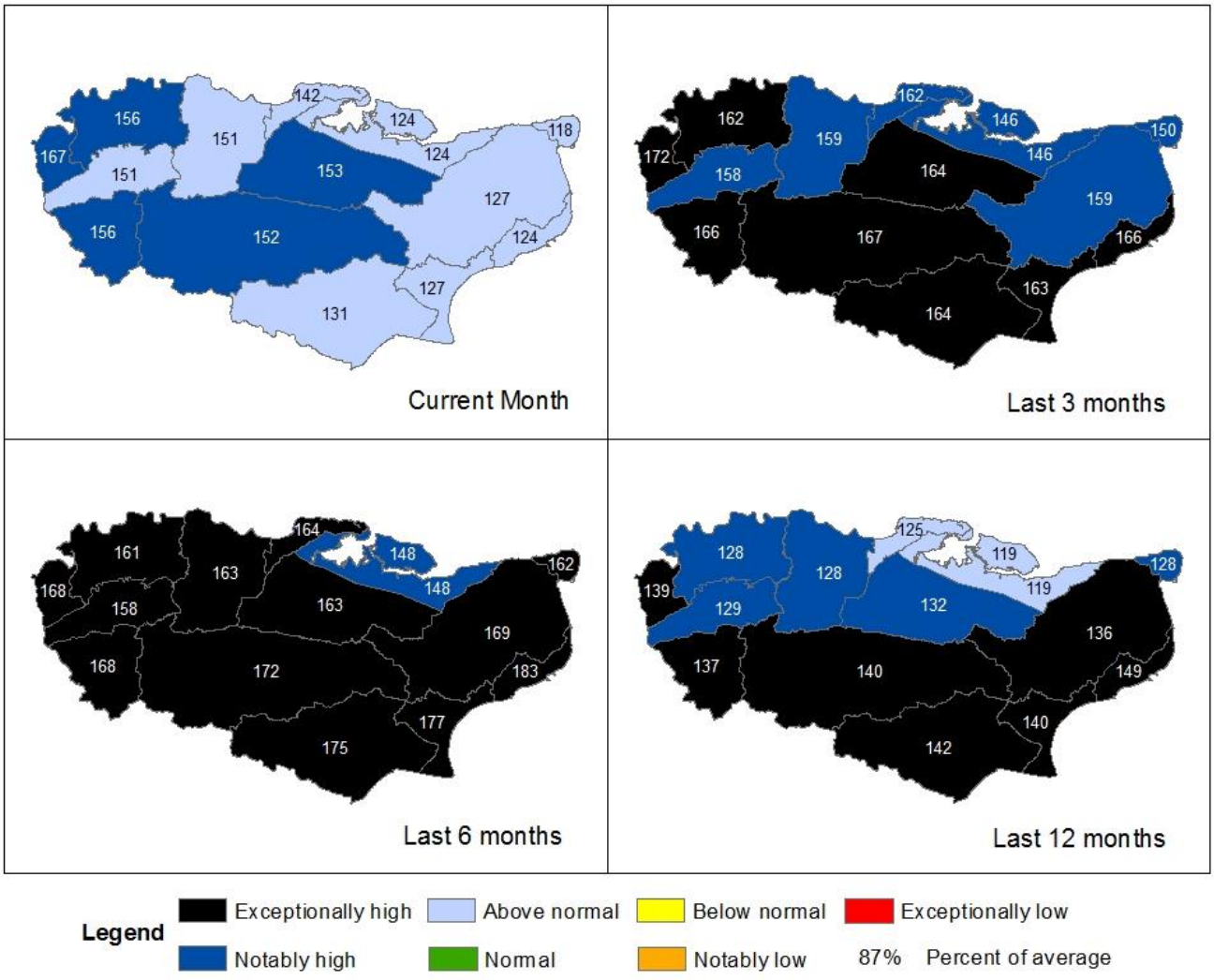
Figure 2.1: Total rainfall for hydrological areas across Kent and South London for the current month (up to 31 March 2024), classed relative to an analysis of respective historic totals. Table available in the appendices with more detailed information.



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

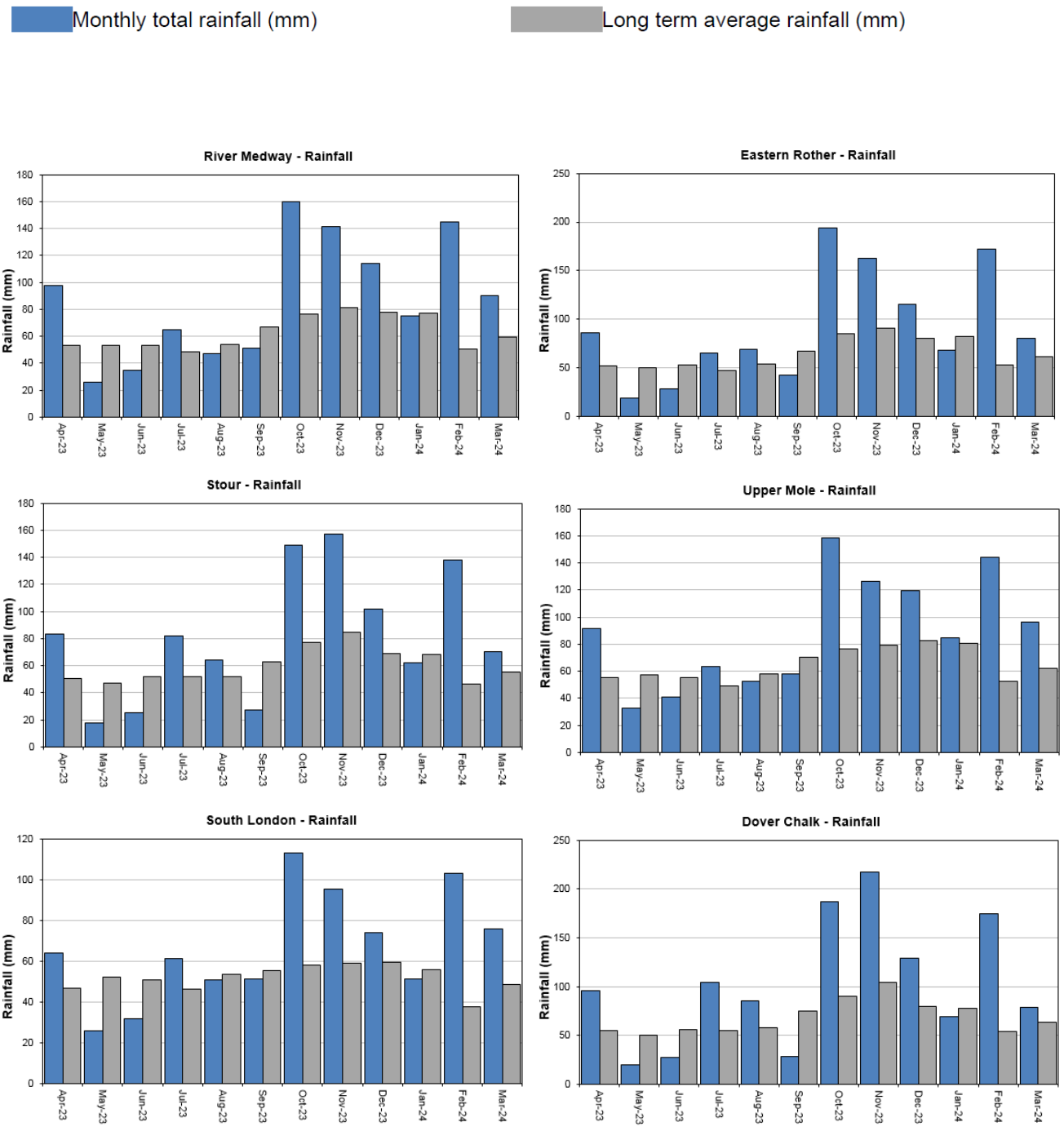
Figure 2.2: Total rainfall for hydrological areas for the current month (up to 31 March 2024), the last 3 months, the last 6 months, and the last 12 months, classed relative to an analysis of respective historic totals. Table available in the appendices with detailed information.

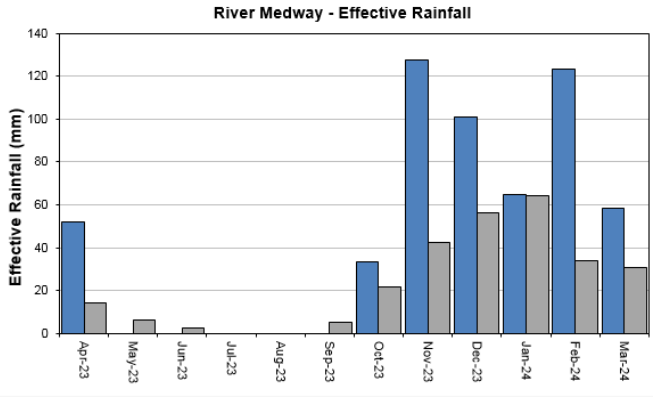


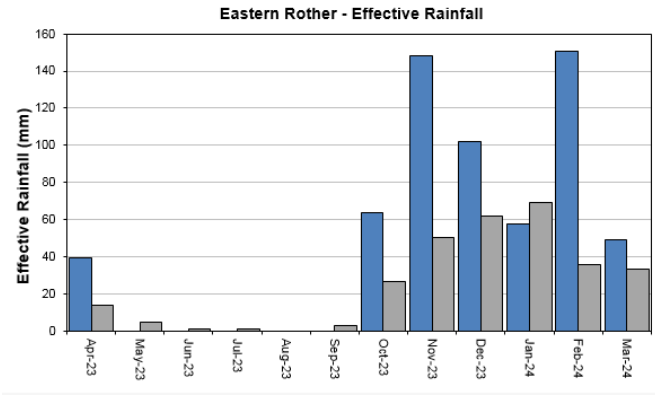
HadUK data based on the Met Office 1km gridded rainfall dataset derived from rain gauges (Source: Met Office. Crown copyright, 2024). Provisional data based on Environment Agency 1km gridded rainfall dataset derived from Environment Agency intensity rain gauges. Includes material based on Ordnance Survey 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.

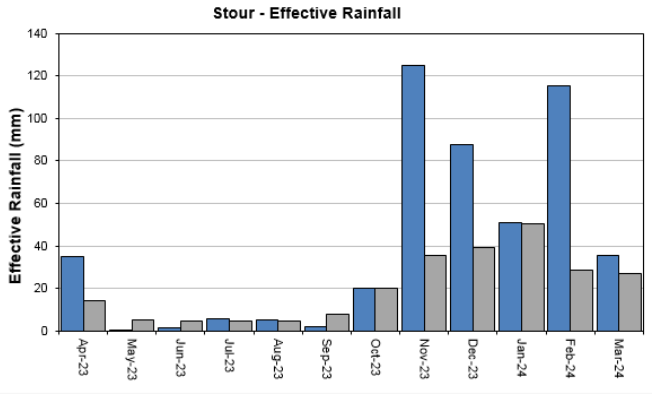
2.3 Rainfall and effective rainfall charts

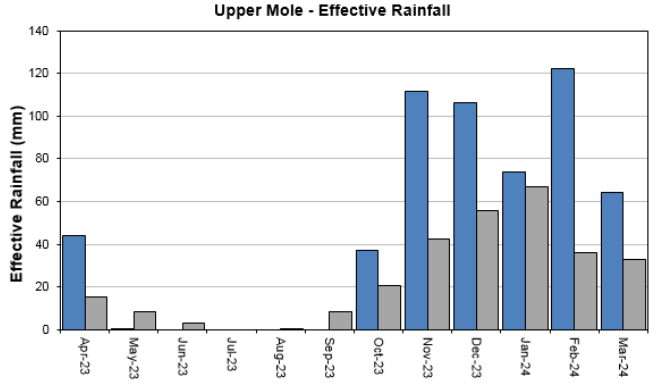
Figure 2.3: : Monthly rainfall and effective rainfall totals for the past 12 months as a percentage of the 1961 to 1990 long term average (LTA) for a selection of areal units. HadUK rainfall data. (Source: Met Office. Crown copyright, 2024). EA effective rainfall data (Source EA Soil Moisture Model).

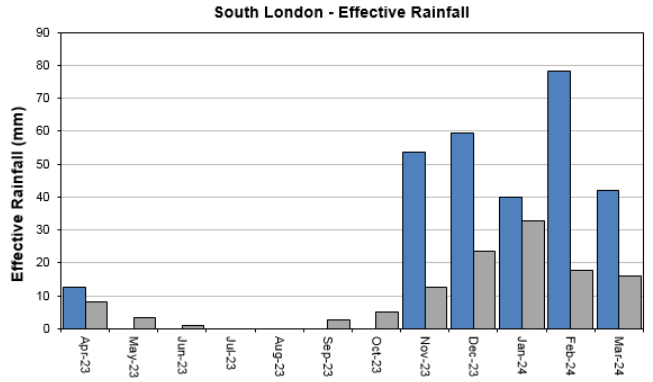


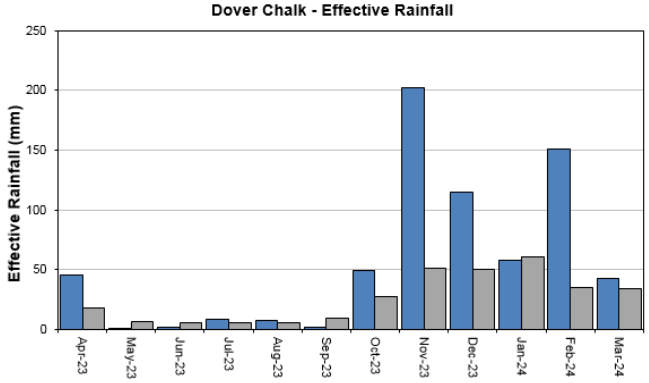

River Medway - Effective Rainfall
Effective Rainfall (mm)
0
20
40
60
80
100
120
140
Apr-23
May-23
Jun-23
Jul-23
Aug-23
Sep-23
Oct-23
Nov-23
Dec-23
Jan-24
Feb-24
Mar-24


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


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


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


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


Dover Chalk - Effective Rainfall
Effective Rainfall (mm)
0
50
100
150
200
250
Apr-23
May-23
Jun-23
Jul-23
Aug-23
Sep-23
Oct-23
Nov-23
Dec-23
Jan-24
Feb-24
Mar-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) 31 day Total	March% LTA	Effective Rainfall (mm) 31 day Total	March % LTA
6230TH	North Downs - South London (W)	93	151%	61	181%
6505TH	Upper Mole	97	156%	64	197%
6508TH	South London	76	156%	42	261%
6706So	Darent	80	151%	48	198%
6707So	North Kent Chalk	85	153%	51	193%
6708So	Stour	70	127%	36	132%
6709So	Dover Chalk	79	124%	42	125%
6710So	Thanet Chalk	50	118%	19	260%
6809So	Medway	90	152%	59	190%
6810So	Eastern Rother	81	131%	49	148%

6811So	Romney Marsh	64	127%	29	131%
6812So	North West Grain	61	142%	27	249%
6813So	Sheppey	55	124%	20	164%
	Kent & South London Average	75	140%	42	176%

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.

Winter period 01/10/2023 to 31/03/2024

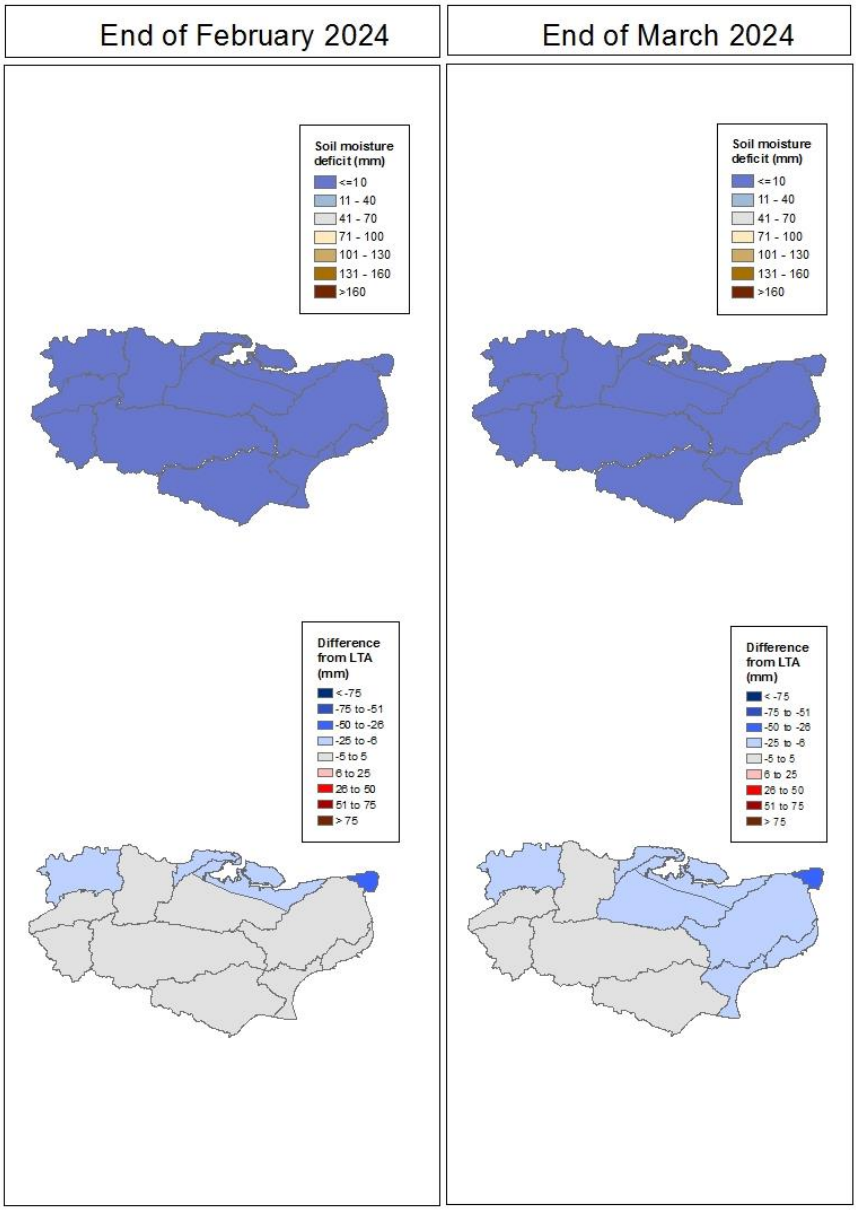
Number	Hydrological Area	Seasonal Rainfall (mm) Total	% LTA	Seasonal Effective Rainfall (mm) Total	% LTA
6230TH	North Downs - South London (W)	655	157%	439	187%
6505TH	Upper Mole	730	168%	515	202%
6508TH	South London	512	161%	273	253%
6706So	Darent	589	163%	347	207%
6707So	North Kent Chalk	625	164%	384	201%
6708So	Stour	678	169%	435	216%
6709So	Dover Chalk	857	183%	619	238%
6710So	Thanet Chalk	502	162%	214	329%
6809So	Medway	726	172%	509	204%
6810So	Eastern Rother	792	175%	572	206%

6811So	Romney Marsh	679	177%	435	231%
6812So	North West Grain	466	163%	202	286%
6813So	Sheppey	446	147%	181	225%
	Kent & South London Average	635	167%	394	218%

3 Soil moisture deficit

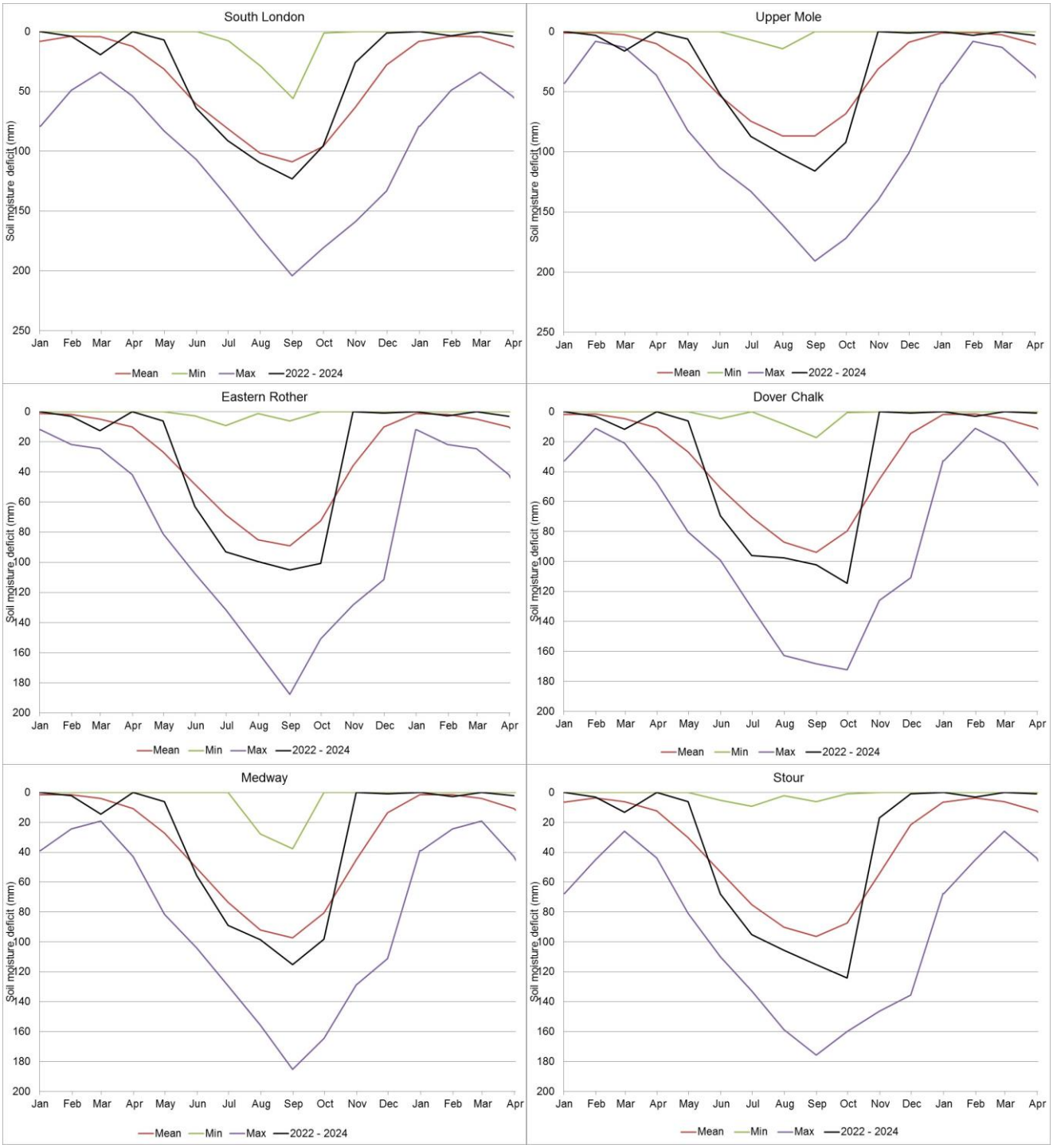
3.1 Soil moisture deficit map

Figure 3.1: Soil moisture deficits for weeks ending 29 February (left panel) and 31 March 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

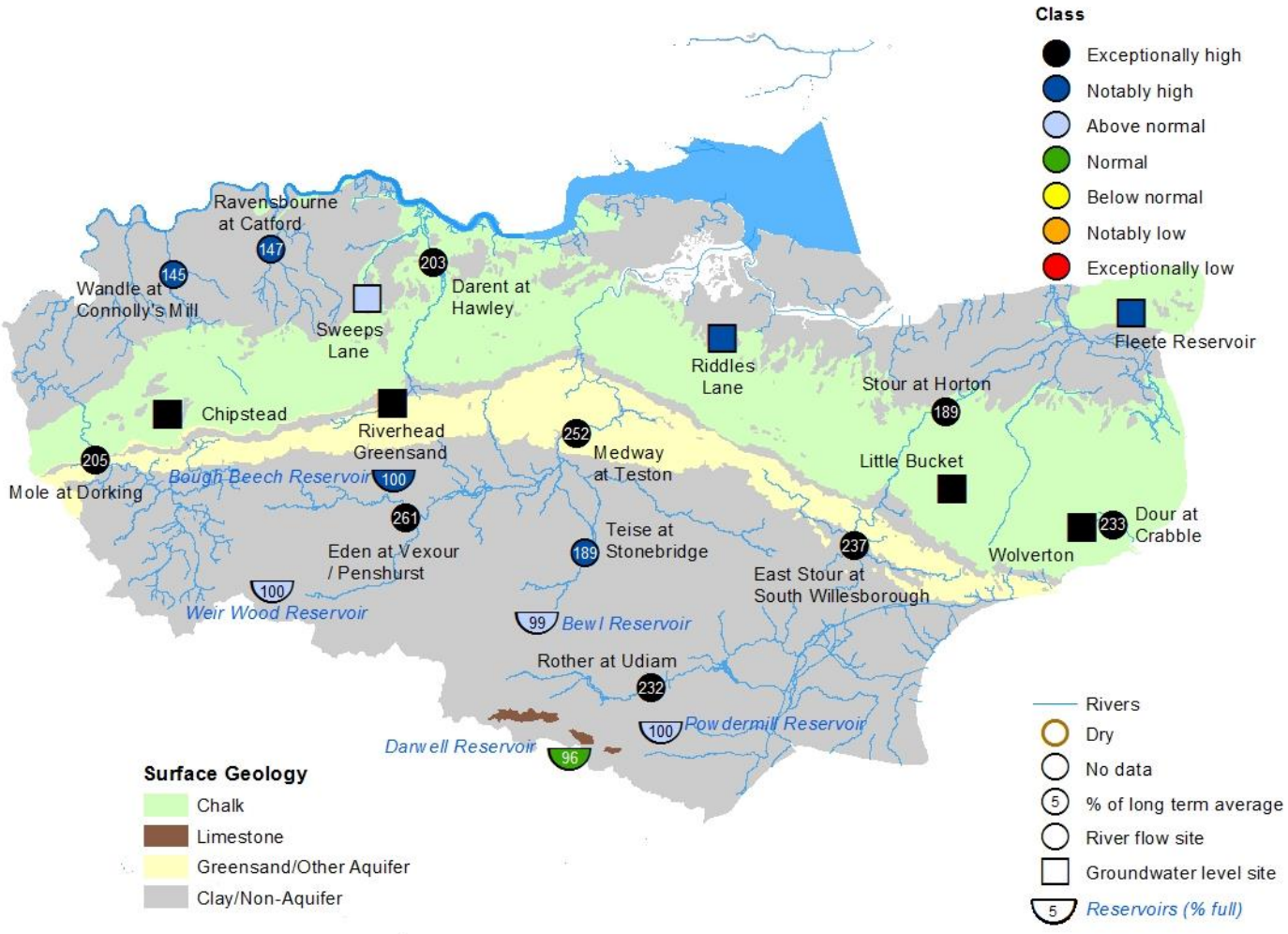
Figure 3.3: This is a second estimate of soil moisture deficit for the hydrological areas across the Kent and South London area. There may be significant variation within each area which must be considered when interpreting these data. EA soil moisture deficit data (Source EA Soil Moisture Model).

Number	Hydrological Area	SMD (mm) Day 31	End March LTA
6230TH	North Downs - South London (W)	2	7
6505TH	Upper Mole	3	6
6508TH	South London	4	11
6706So	Darent	3	8
6707So	North Kent Chalk	1	7
6708So	Stour	1	7
6709So	Dover Chalk	1	7
6710So	Thanet Chalk	10	44
6809So	Medway	2	6
6810So	Eastern Rother	3	6
6811So	Romney Marsh	0	7
6812So	North West Grain	3	14
6813So	Sheppey	3	13
	Kent & South London Average	3	11

4 River flows, groundwater levels and reservoir stocks

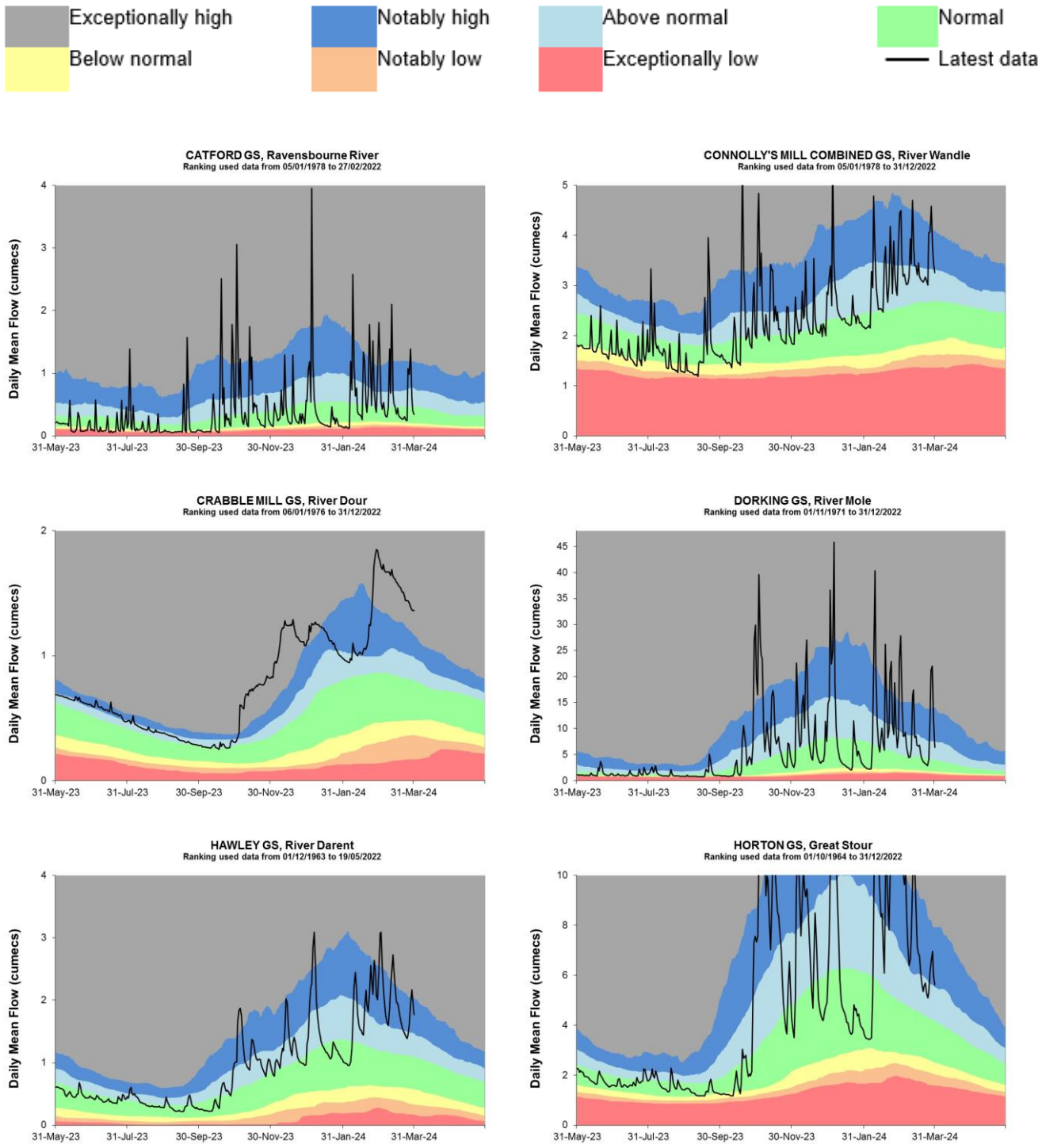
4.1 River flows, groundwater levels and reservoir stocks map

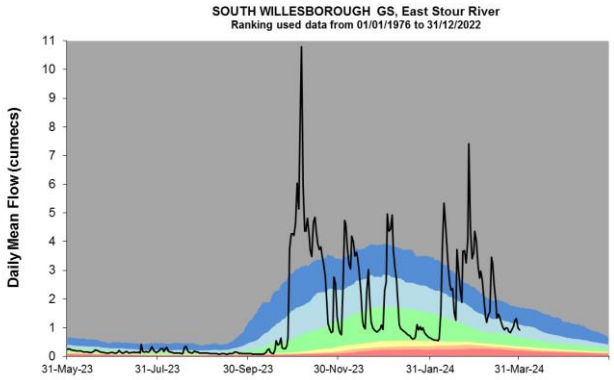
Figure 4.1: Monthly mean river flows for indicator sites for March 2024, expressed as a percentage of the respective long term average and classed relative to an analysis of historic March monthly means. End of month groundwater levels for indicator sites for March 2024, expressed as a percentage of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

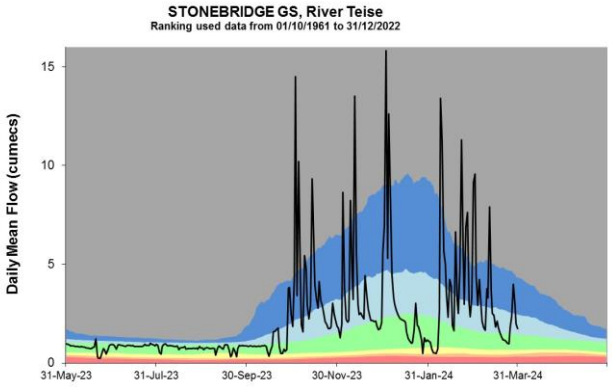


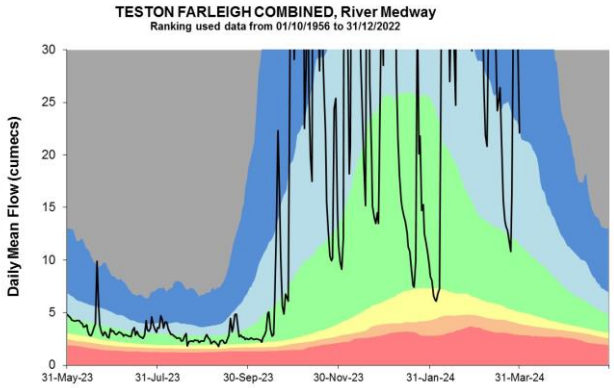
4.2 River flow charts

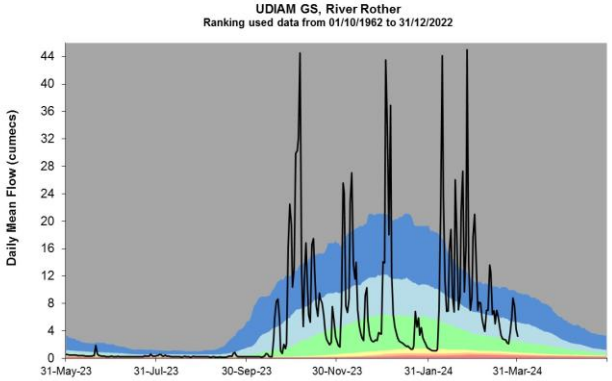
Figure 4.1: Daily mean river flow for index sites over the past year, compared to an analysis of historic daily mean flows, and long term maximum and minimum flows.

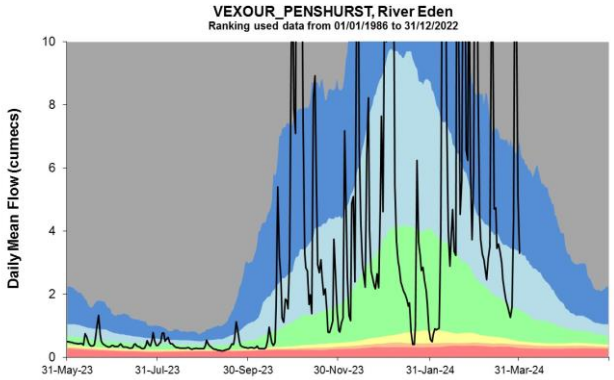










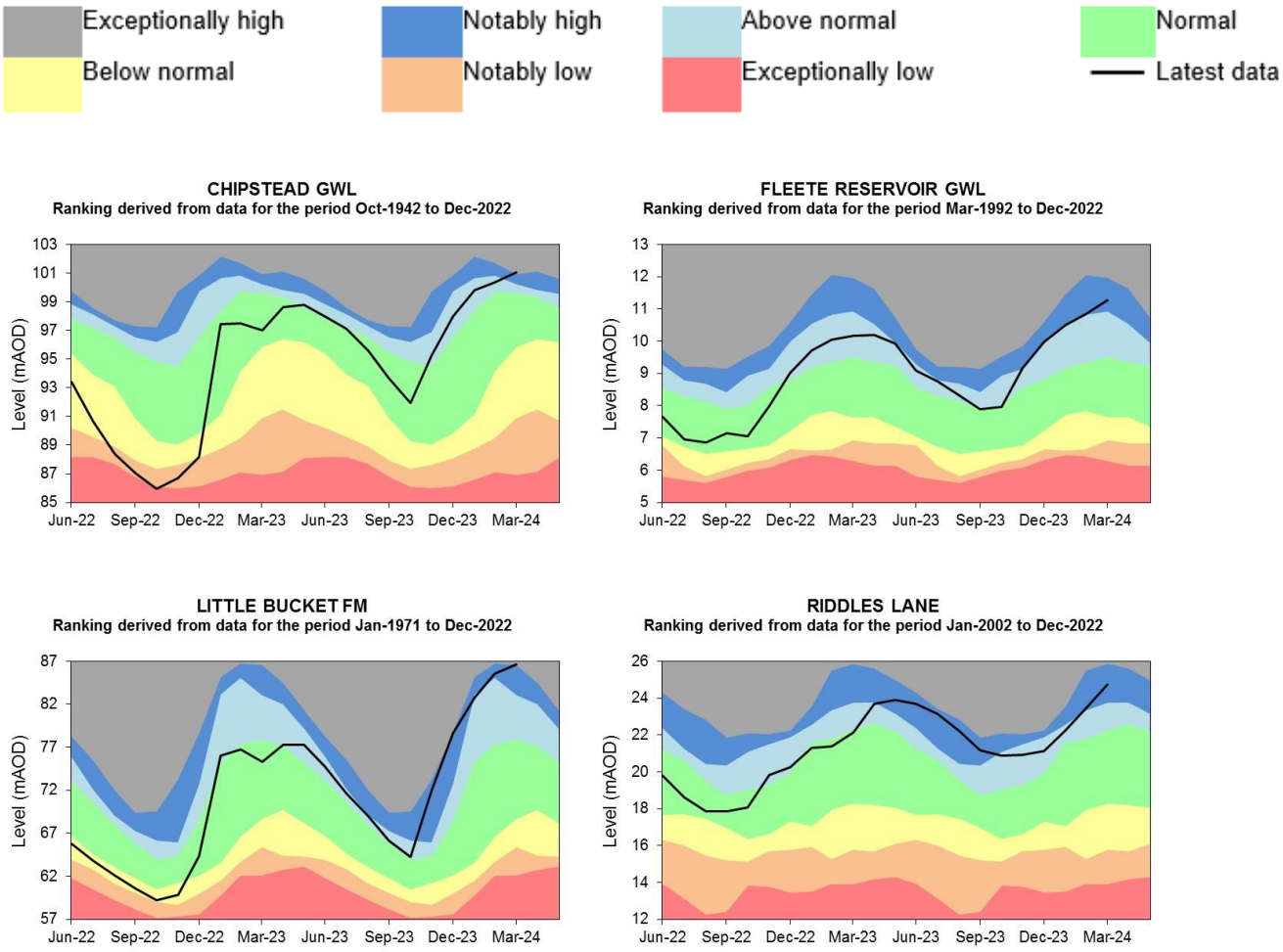


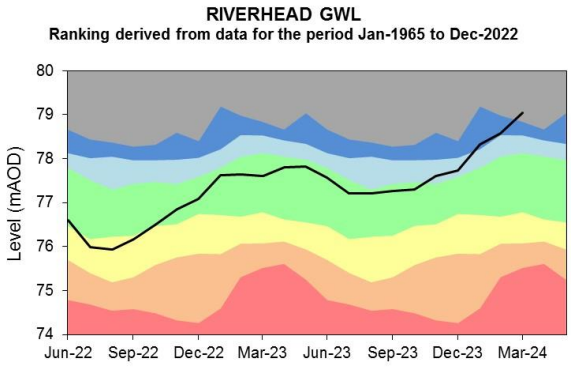
Source: Environment Agency.

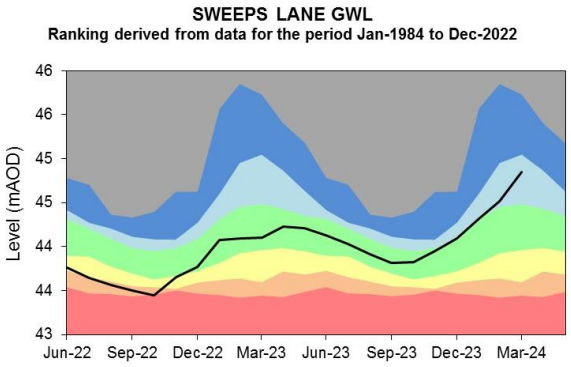
5 Groundwater levels

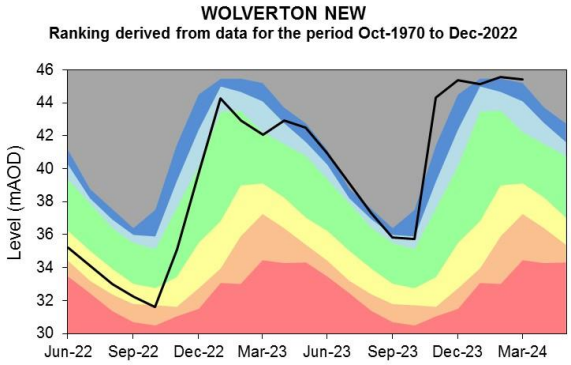
5.1 Groundwater level charts

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.







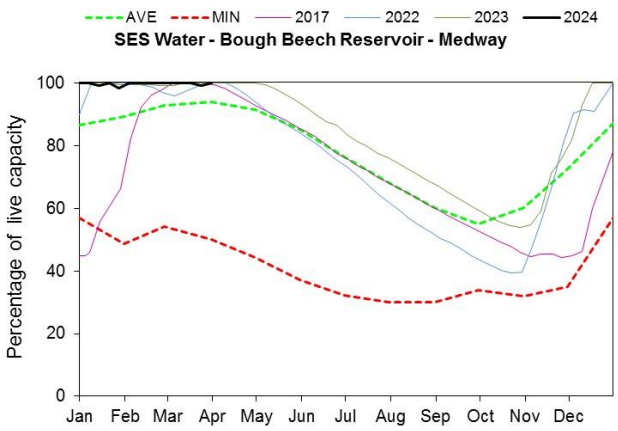


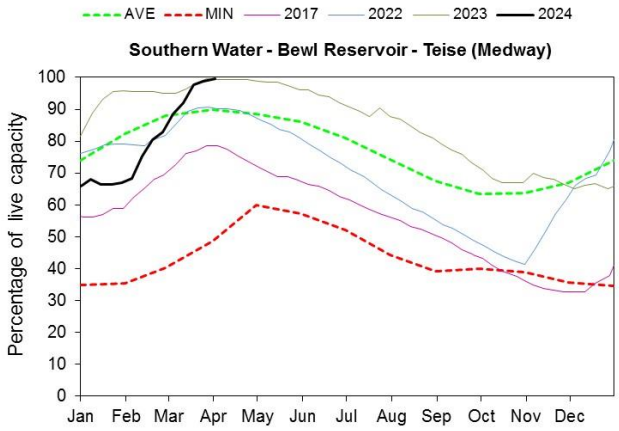
Source: Environment Agency, 2024.

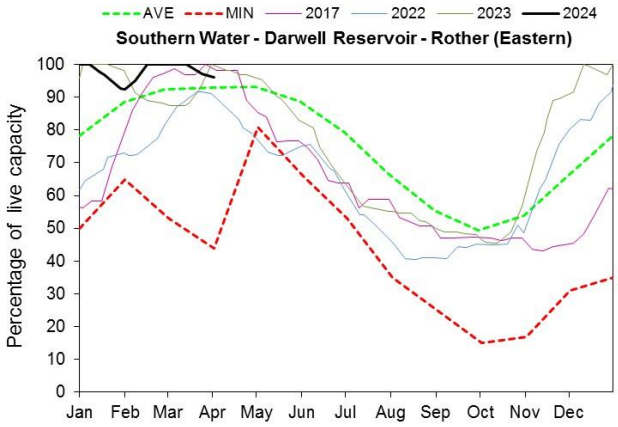
6 Reservoir stocks

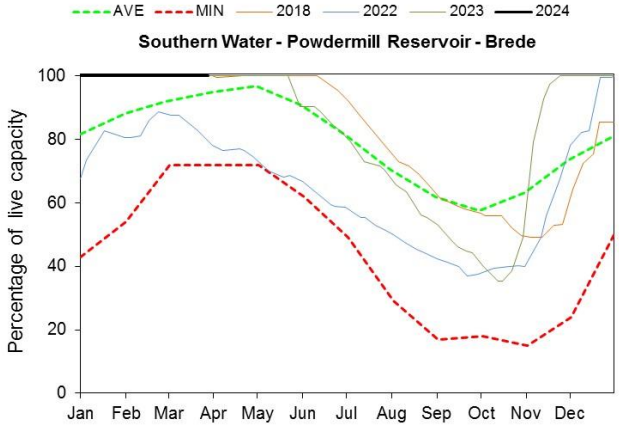
6.1 Reservoir stocks charts

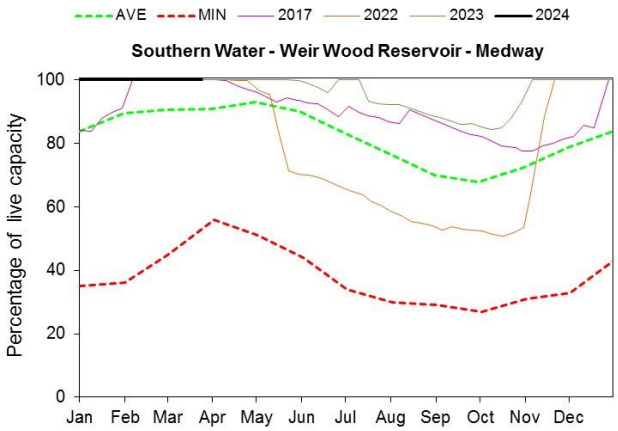
Figure 7.1: End of month regional reservoir stocks compared to long term maximum, minimum and average stocks. (Source: Water Companies). Note: Historic records of individual reservoirs and reservoir groups making up the regional values vary in length.











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	Mar 2024 rainfall % of long term average 1961 to 1990	Mar 2024 band	Jan 2024 to March cumulative band	Oct 2023 to March cumulative band	Apr 2023 to March cumulative band
North Downs - South London	151	Above Normal	Notably high	Exceptionally high	Notably high
Upper Mole	156	Notably High	Exceptionally high	Exceptionally high	Exceptionally high
South London	156	Notably High	Exceptionally high	Exceptionally high	Notably high
River Darent	151	Above Normal	Notably high	Exceptionally high	Notably high
North Kent Chalk	153	Notably High	Exceptionally high	Exceptionally high	Notably high
Stour	127	Above Normal	Notably high	Exceptionally high	Exceptionally high
Dover Chalk	124	Above Normal	Exceptionally high	Exceptionally high	Exceptionally high
Thanet Chalk	118	Above Normal	Notably high	Exceptionally high	Notably high
River Medway	152	Notably High	Exceptionally high	Exceptionally high	Exceptionally high

Eastern Rother	131	Above Normal	Exceptionally high	Exceptionally high	Exceptionally high
Romney Marsh	127	Above Normal	Exceptionally high	Exceptionally high	Exceptionally high
North West Grain	142	Above Normal	Notably high	Exceptionally high	Above normal
Sheppy	124	Above Normal	Notably high	Notably high	Above normal

8.2 River flows table

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

8.3 Groundwater table

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