Monthly water situation report: Solent and South Downs Area

Summary - September 2023

Solent and South Downs (SSD) had average rainfall in September, receiving 92% (66mm) of the long term average (LTA) rainfall (72mm). Monthly mean river flows across SSD ranged from normal to exceptionally high. Groundwater levels ranged from normal to notably high. Soils across SSD ended the month drier than the average for September. End of month reservoir stocks at Ardingly Reservoir (Ouse) and at Arlington Reservoir (Cuckmere) were both below average.

1.1 Rainfall

SSD had average rainfall in September, receiving 92% (66mm) of the LTA rainfall (72mm). Every rainfall unit across SSD for September had average (normal) rainfall, except for the Test Chalk unit which received 140% (95mm) of the average rainfall (68mm). The lowest rainfall was received at the opposite end, the most eastern edge, of SSD in the Pevensey Levels where rainfall amounted to 64% (44mm) of LTA (88mm). In general the higher rainfall was in the western area of SSD.

The highest daily totals for the month were recorded on the 17 and 20 September when over 90% of the monthly total rainfall fell over these two days. The highest daily total of 54mm was recorded on the 17 September at Iping Mill (Western Rother Greensand) and 51mm was recorded at Andover (Test Chalk). On the 20 September the highest rainfall was about 44mm at Harestock (East Hampshire Tertiaries) and Testwood (Hampshire Tertiaries).

The end of September is the end of the summer season and 2023 received an unremarkable amount of summer rainfall, except in the Test Chalk areal unit which had the 12th wettest April to September on its record. The end of September is also the end of the water year and the past 12 months have recorded exceptionally high rainfall over most of SSD. The SSD areal rainfall unit along with the East Hampshire Chalk, Western Rother Greensand and Hampshire Tertiaries all had their 4th highest October to September rainfall on record. The remaining units had rainfall in the top 10 highest for that period.

1.2 Soil moisture deficit and recharge

Soils were drier than average in Sussex and were wetter than average in Hampshire and the Isle of Wight. Overall soils across SSD ended the month drier than the average for September.

1.3 River flows

Monthly mean river flows across SSD ranged from normal to exceptionally high. Flows in the River Itchen at Allbrook & Highbridge were exceptionally high.

Flows were above normal:

- River Medina at Blackwater
- River Rother at Iping Mill
- River Test at Broadlands
- River Test at Chilbolton
- River Ouse at Goldbridge
- River Lymington at Brockenhurst

Flows were normal:

- River Meon at Mislingford
- River Wallington at North Fareham
- River Arun at Alfoldean
- River Adur at Sakeham
- River Cuckmere at Cowbeech

The River Itchen at Allbrook & Highbridge was the second highest (since1959), the River Medina at Blackwater was the seventh highest (since 1989) and the River Test at Chilbolton was the ninth highest (since 1966) on their records for September monthly mean flows.

1.4 Groundwater levels

End of month groundwater levels ranged from normal to notably high.

Groundwater levels were notably high at:

- Clanville Gate (Test Chalk)
- Lopcombe Corner (Test Chalk)
- Preston Candover (East Hampshire Chalk).

Groundwater levels were above normal at:

- Carisbrooke Castle (Isle of Wight)
- West Meon (East Hampshire Chalk),
- Catherington (East Hampshire Chalk)
- Cornish Farm (East Sussex Chalk)
- Youngwoods Copse (Isle of Wight)

Groundwater levels were normal at:

- Harting Common (Western Rother Greensand)
- Chilgrove (West Sussex Chalk)
- Beeding Hill (West Sussex Chalk)
- Houndean Bottom (East Sussex Chalk)

Groundwater levels for September were the seventh highest at Preston Candover on record (starting 1975), the eighth highest on record at Youngwoods Copse (1987) and Lopcombe Corner (1936) and the ninth highest September at Cornish Farm (starting 1981).

1.5 Reservoir stocks

End of month reservoir stocks were both below average at Ardingly Reservoir (Ouse) with 50% of total capacity (LTA 68%) and at Arlington Reservoir (Cuckmere) with 42% of total capacity (LTA 58%).

1.6 Environmental impact

Three licence restrictions were in place at the start of September; one in the River Arun catchment and two on the Isle of Wight. From the second week the 2 Isle of Wight cessations were lifted but 4 additional restrictions came into in the Arun catchment. At the end of the month all but one of the Arun restrictions were lifted.

There were 3 Flood Alerts issued in September, one on the River Test, one on the Monks Brook (Itchen) and one on the River Arun.

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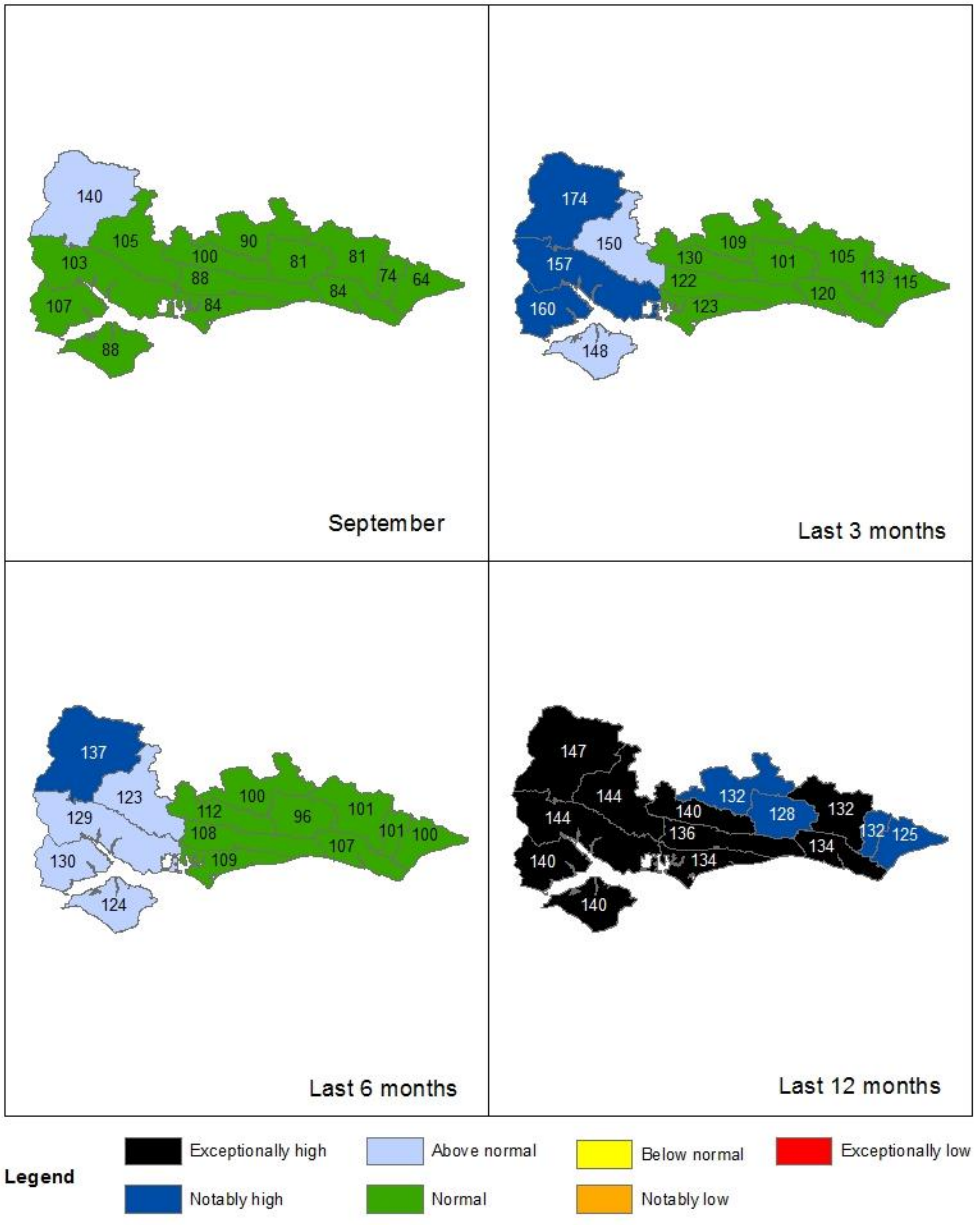
2. Rainfall

2.1 Rainfall map

Figure 2.1: Total rainfall for hydrological areas for the current month (up to 30 September 2023), 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.

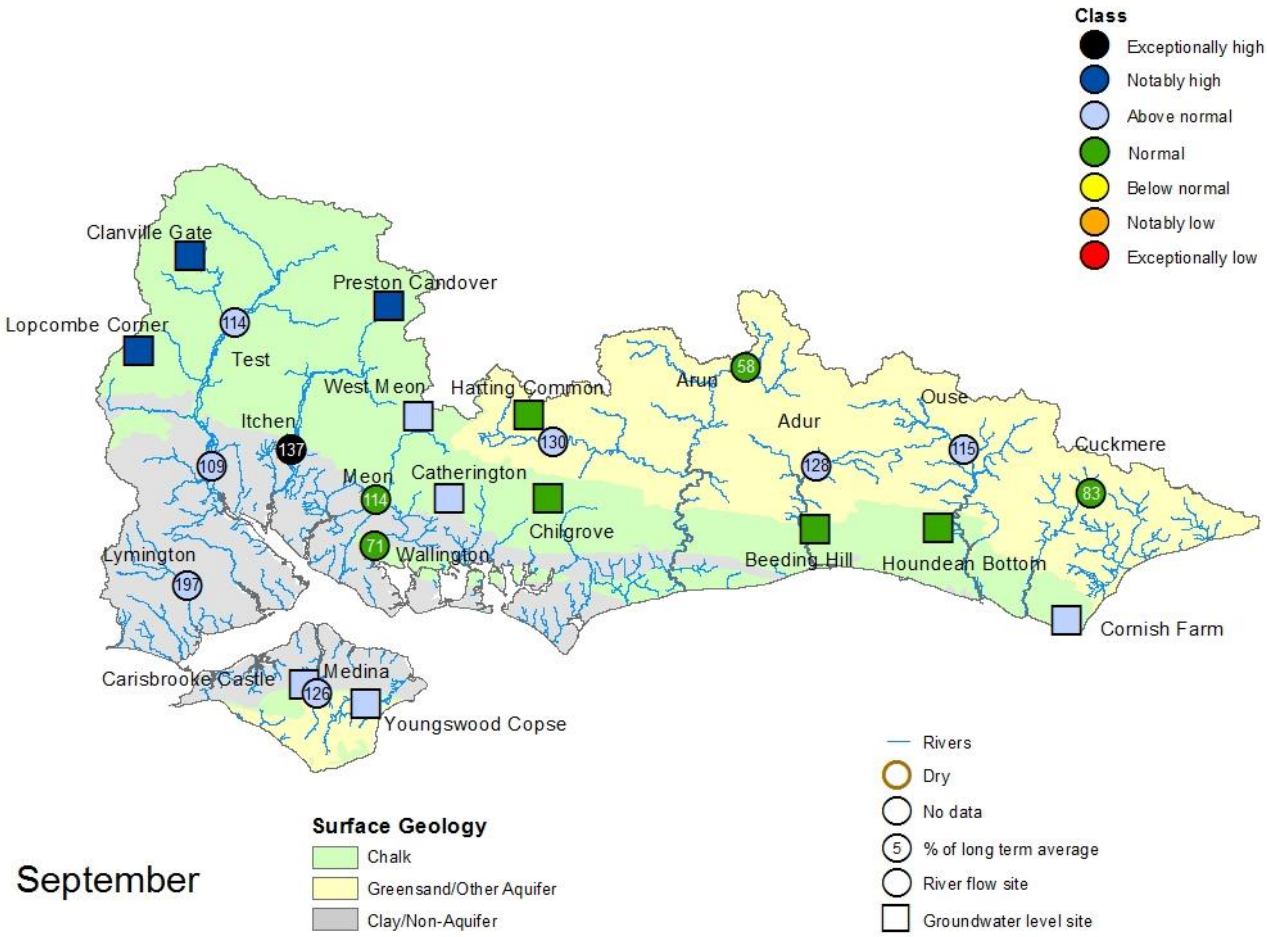


HadUK data based on the Met Office 1km gridded rainfall dataset derived from rain gauges (Source: Met Office. Crown copyright, 2023). Provisional data based on Environment Agency 1km gridded rainfall dataset derived from Environment Agency intensity rain gauges. Crown copyright. All rights reserved. Environment Agency, 100024198, 2023.

3 River flows and Groundwater levels

3.1 River flows and Groundwater level map

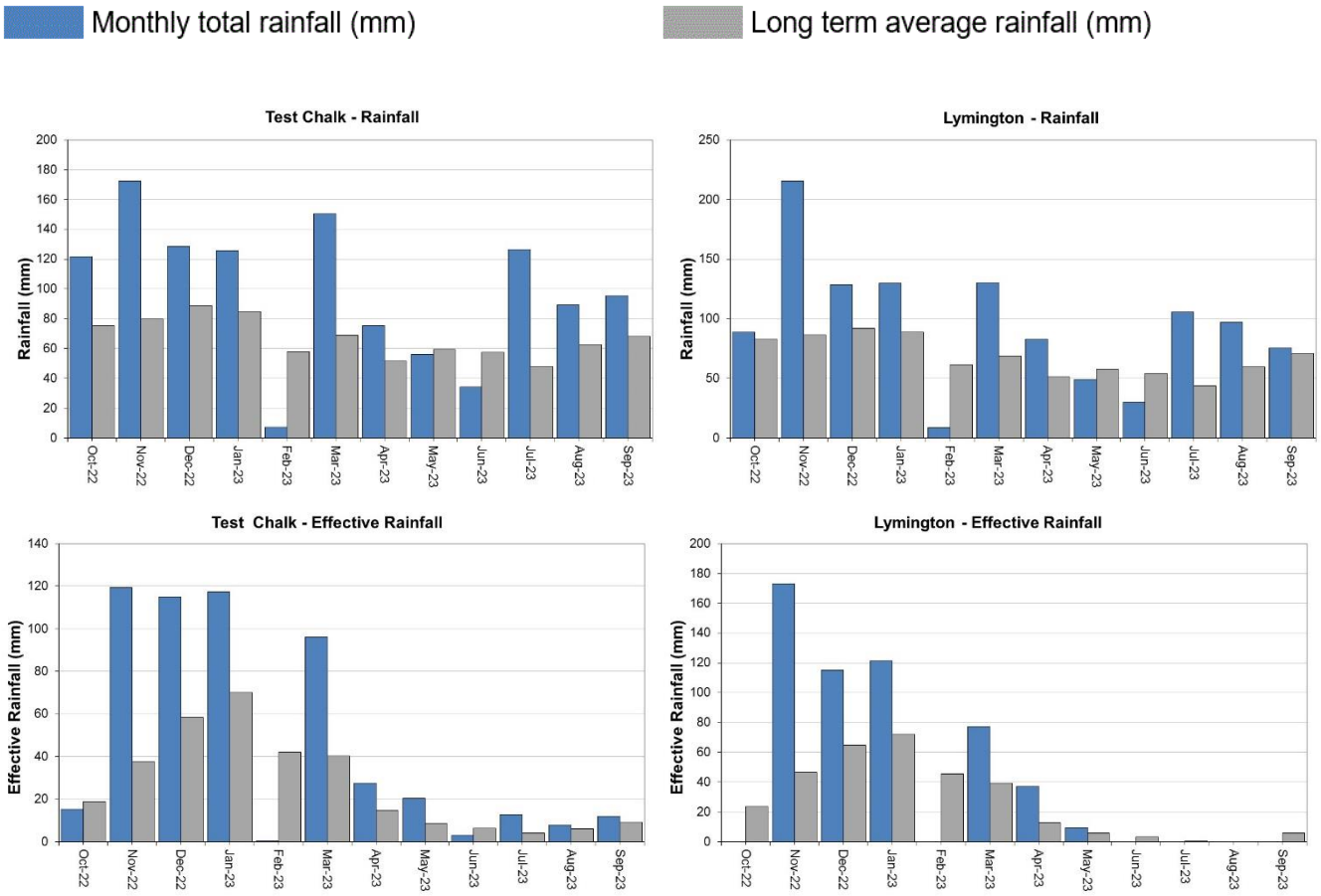
Figure 3.1: Monthly mean river flow and groundwater levels at our indicator sites for September 2023, expressed as a percentage of the respective long term average and classed relative to an analysis of historic September monthly means. Table available in the appendices with detailed information.



4 West Hampshire

4.1 West Hampshire Rainfall and effective rainfall charts

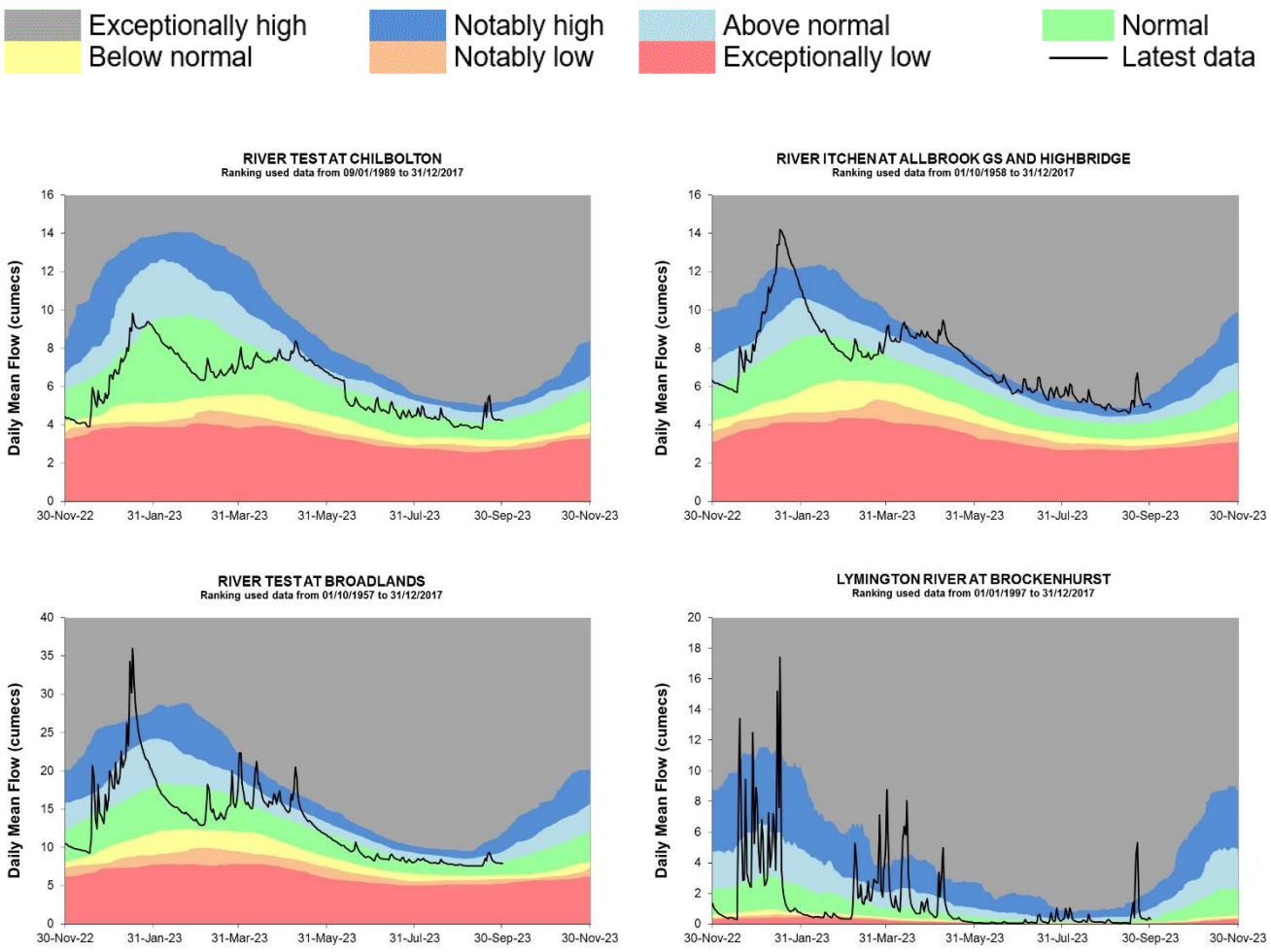
Figure 4.1: Monthly rainfall and effective rainfall totals for the past 12 months compared to the 1961 to 1990 long term average.



HadUK rainfall data. (Source: Met Office. Crown copyright, 2023).

4.2 West Hampshire River flow charts

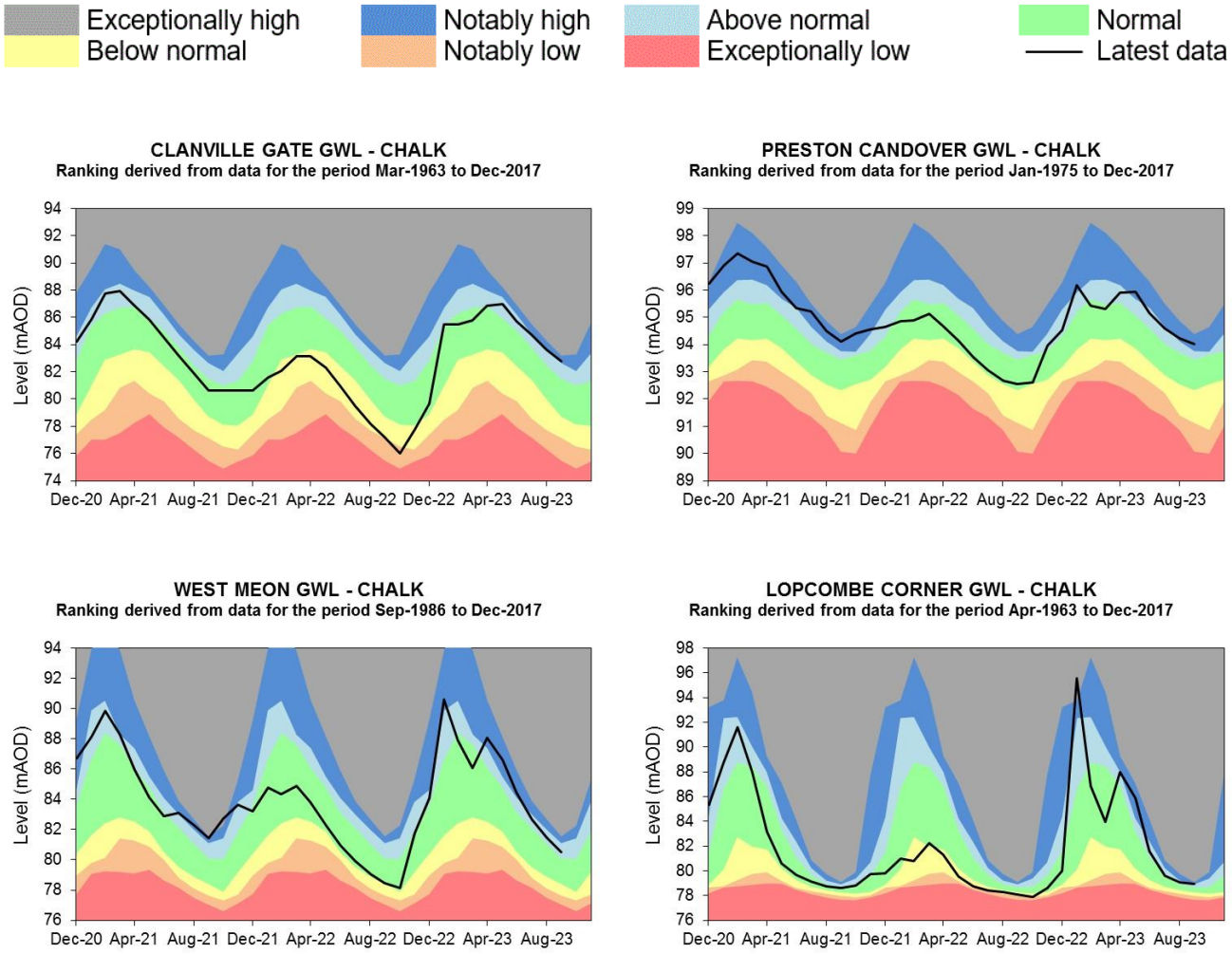
Figure 4.2: Daily mean river flow for index sites over the past year, compared to an analysis of historic daily mean flows, and long term maximum and minimum flows.



Source: Environment Agency, 2023.

4.3 West Hampshire Groundwater level charts

Figure 4.3: End of month groundwater levels at index groundwater level sites for major aquifers. 34 months compared to an analysis of historic end of month levels and long term maximum and minimum levels.

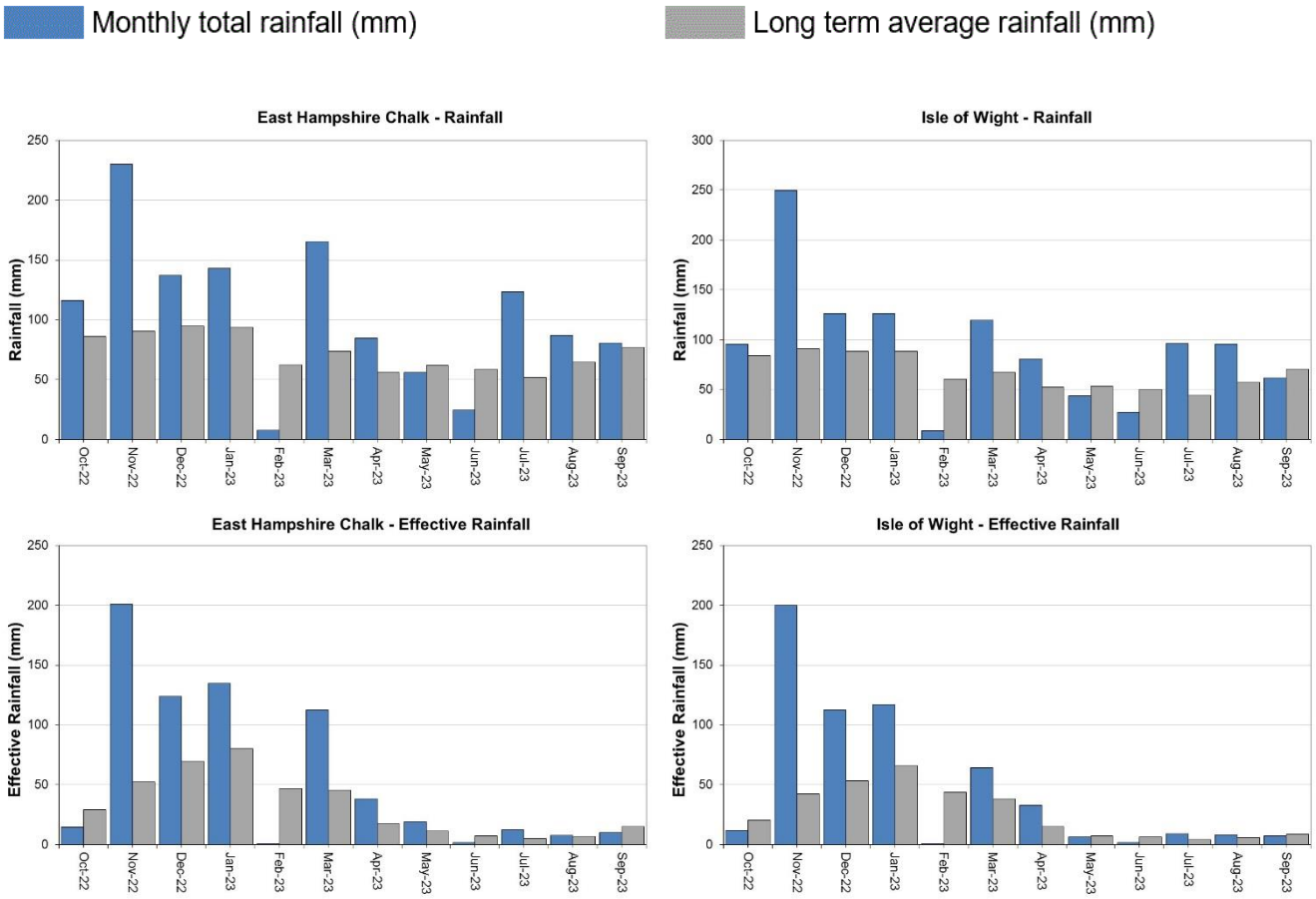


Source: Environment Agency, 2023.

5 East Hampshire and Isle of Wight

5.1 East Hampshire and Isle of Wight Rainfall and Effective rainfall charts

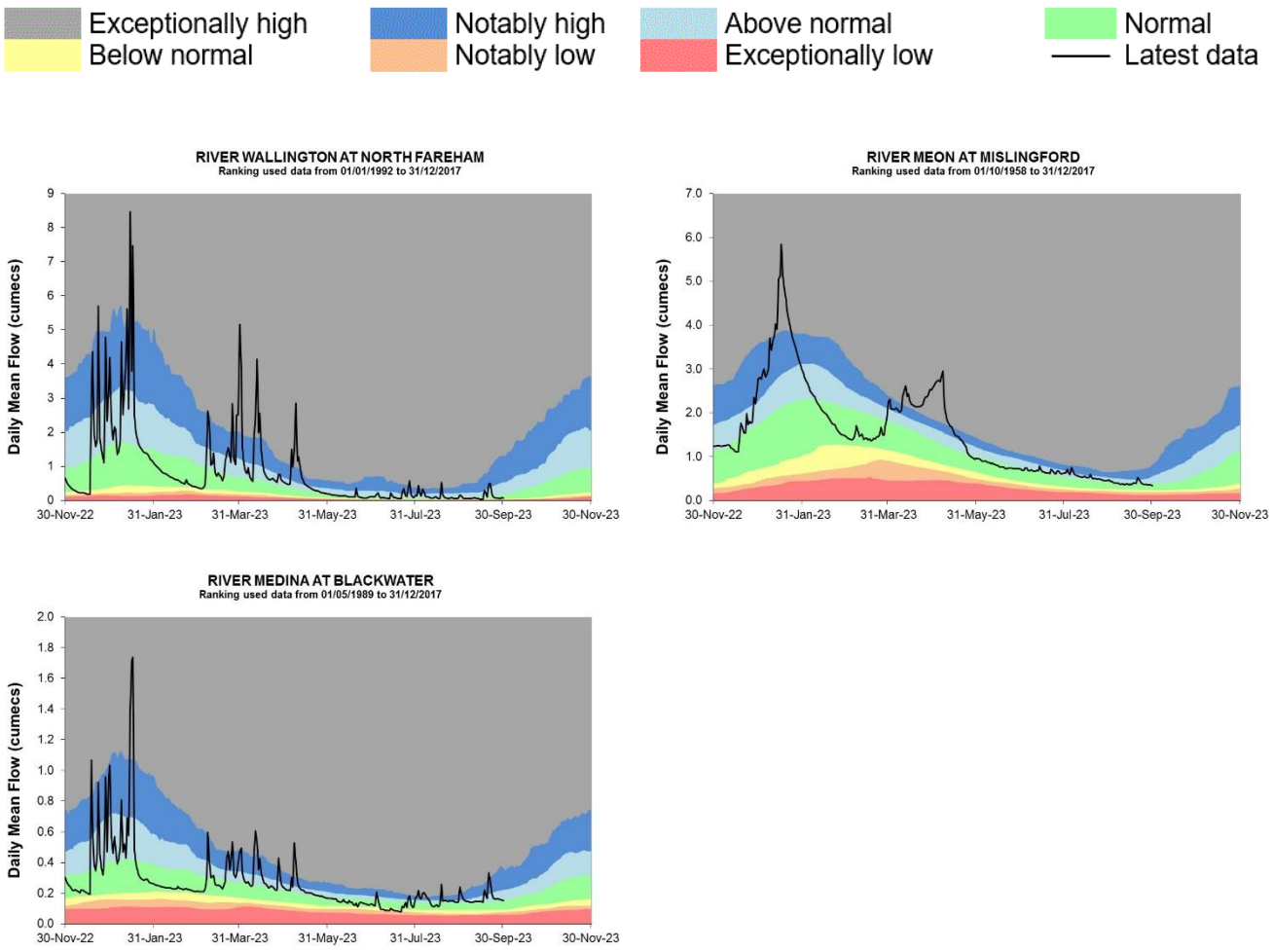
Figure 5.1: Monthly rainfall and effective rainfall totals for the past 12 months compared to the 1961 to 1990 long term average.



HadUK rainfall data. (Source: Met Office. Crown copyright, 2023).

5.2 East Hampshire and Isle of Wight River flow charts

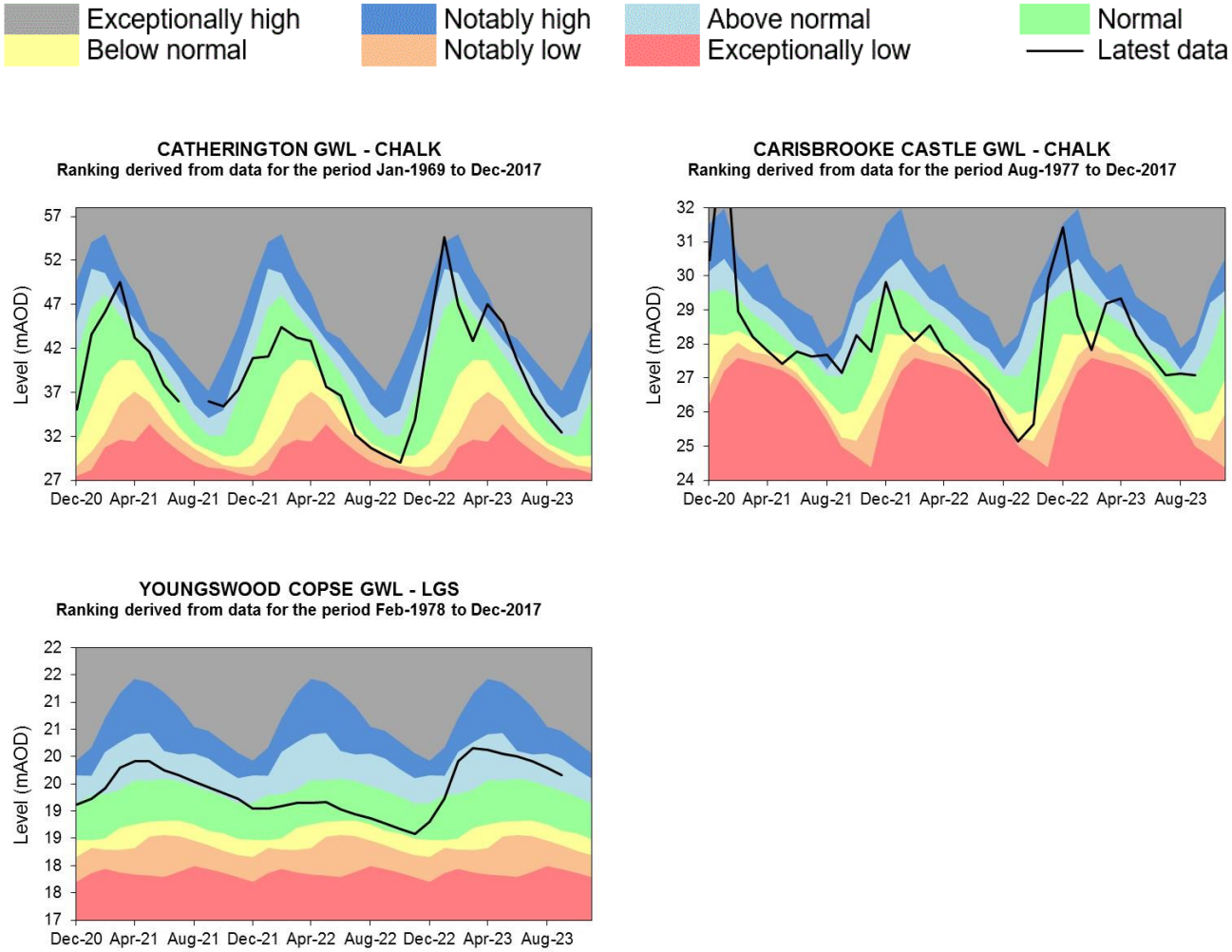
Figure 5.2 Daily mean river flow for index sites over the past year, compared to an analysis of historic daily mean flows, and long term maximum and minimum flows.



Source: Environment Agency, 2023.

5.3 East Hampshire and Isle of Wight Groundwater level charts

Figure 5.3: End of month groundwater levels at index groundwater level sites for major aquifers. 34 months compared to an analysis of historic end of month levels and long term maximum and minimum levels.

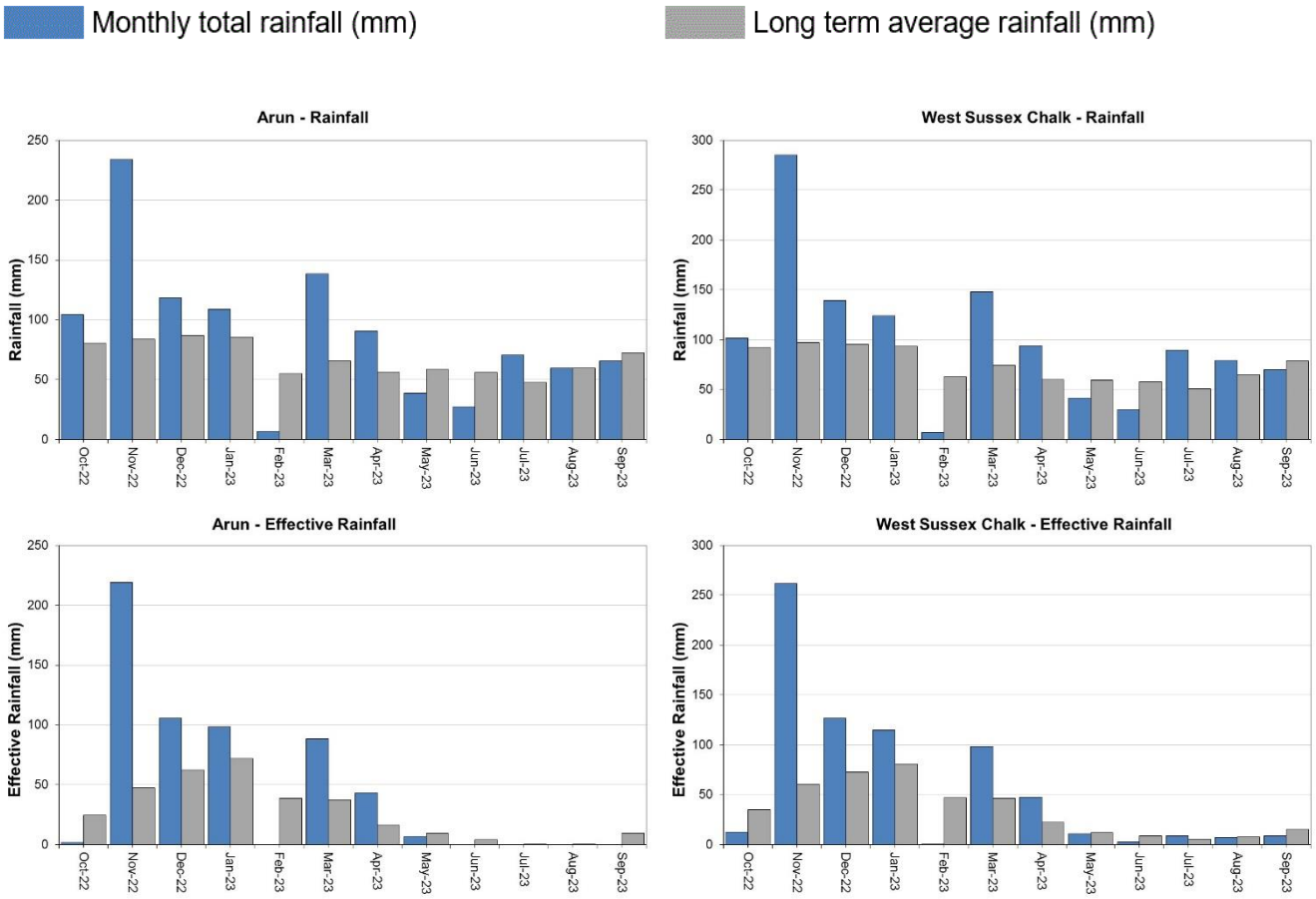


Source: Environment Agency, 2023.

6 West Sussex

6.1 West Sussex Rainfall and Effective Rainfall charts

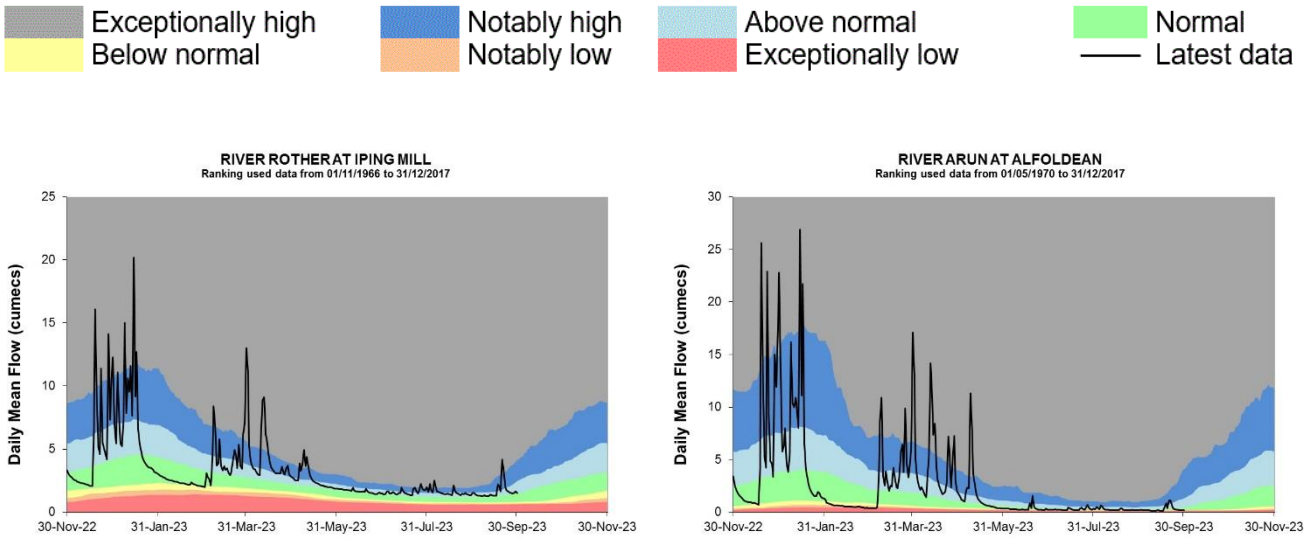
Figure 6.1: Monthly rainfall and effective rainfall totals for the past 12 months as a percentage of the 1961 to 1990 long term average.



HadUK rainfall data. (Source: Met Office. Crown copyright, 2023).

6.2 West Sussex River flow charts

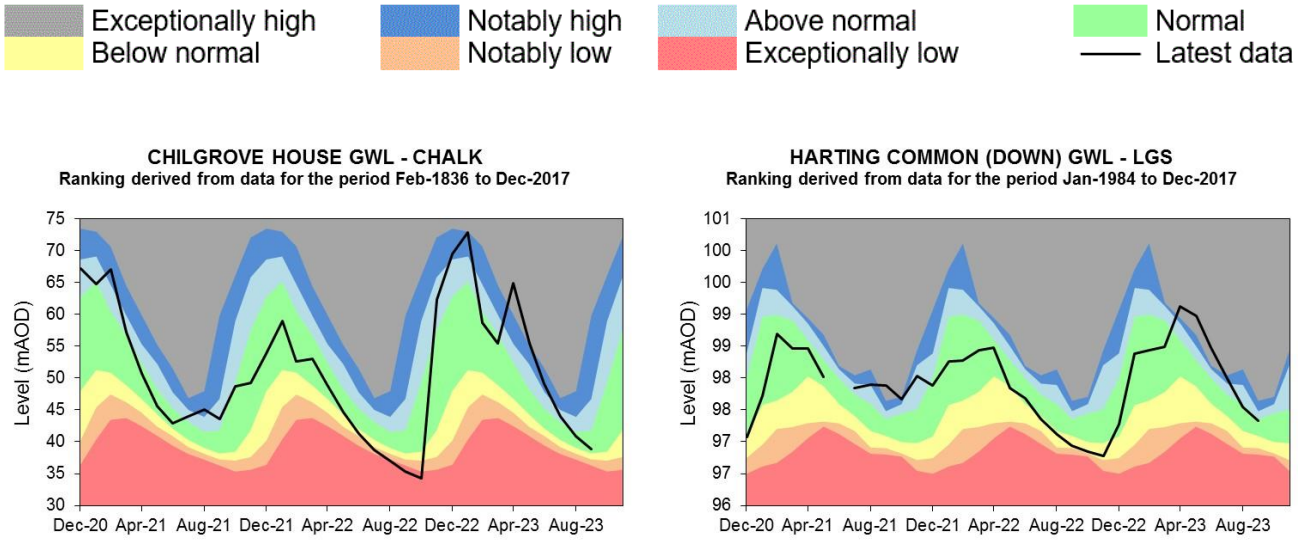
Figure 6.2: Daily mean river flow for index sites over the past year, compared to an analysis of historic daily mean flows, and long term maximum and minimum flows.



Source: Environment Agency, 2023.

6.3 West Sussex Groundwater level charts

Figure 6.3: End of month groundwater levels at index groundwater level sites for major aquifers. 34 months compared to an analysis of historic end of month levels and long term maximum and minimum levels.

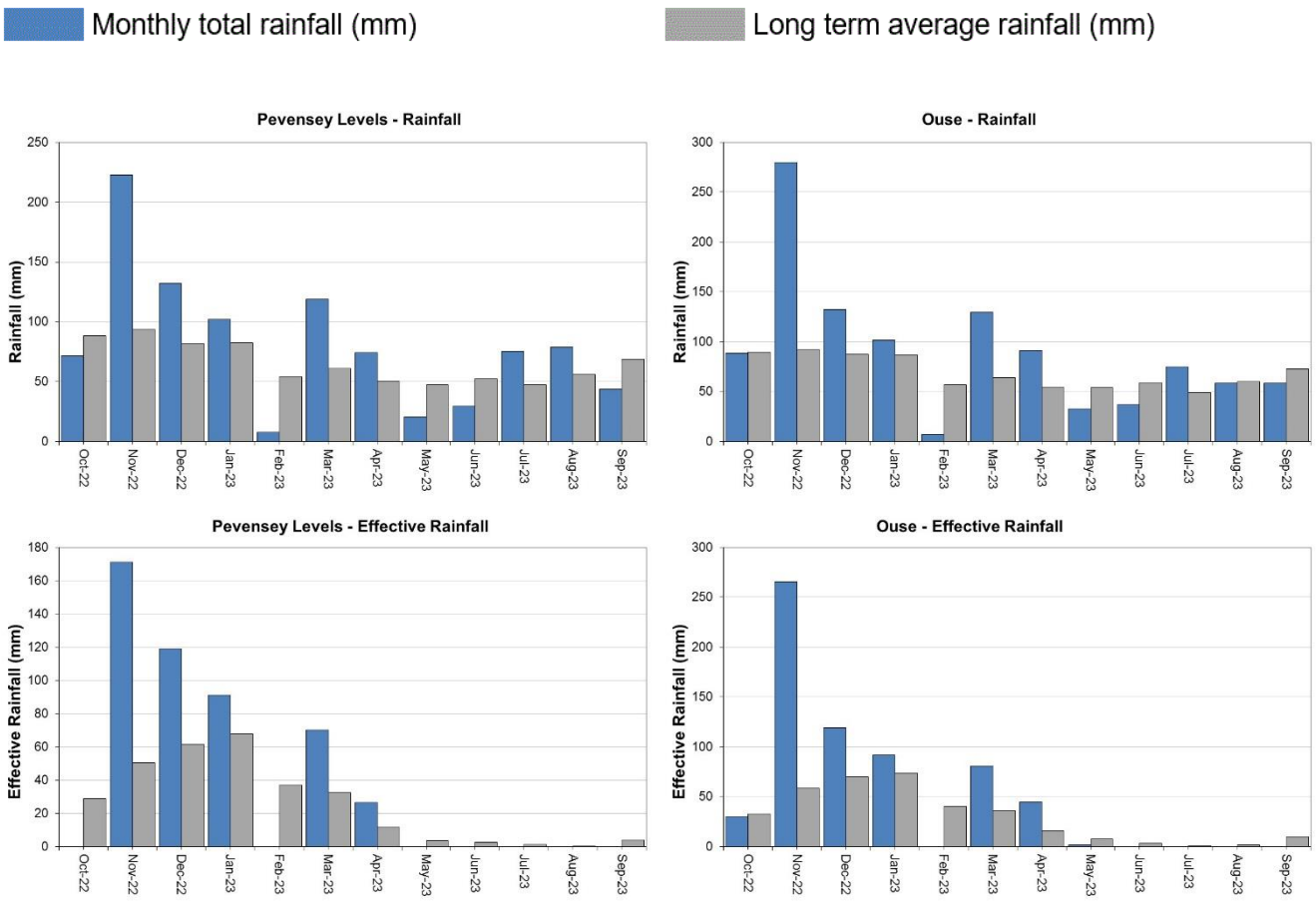


Source: Environment Agency, 2023.

7 East Sussex

7.1 East Sussex Rainfall and Effective Rainfall charts

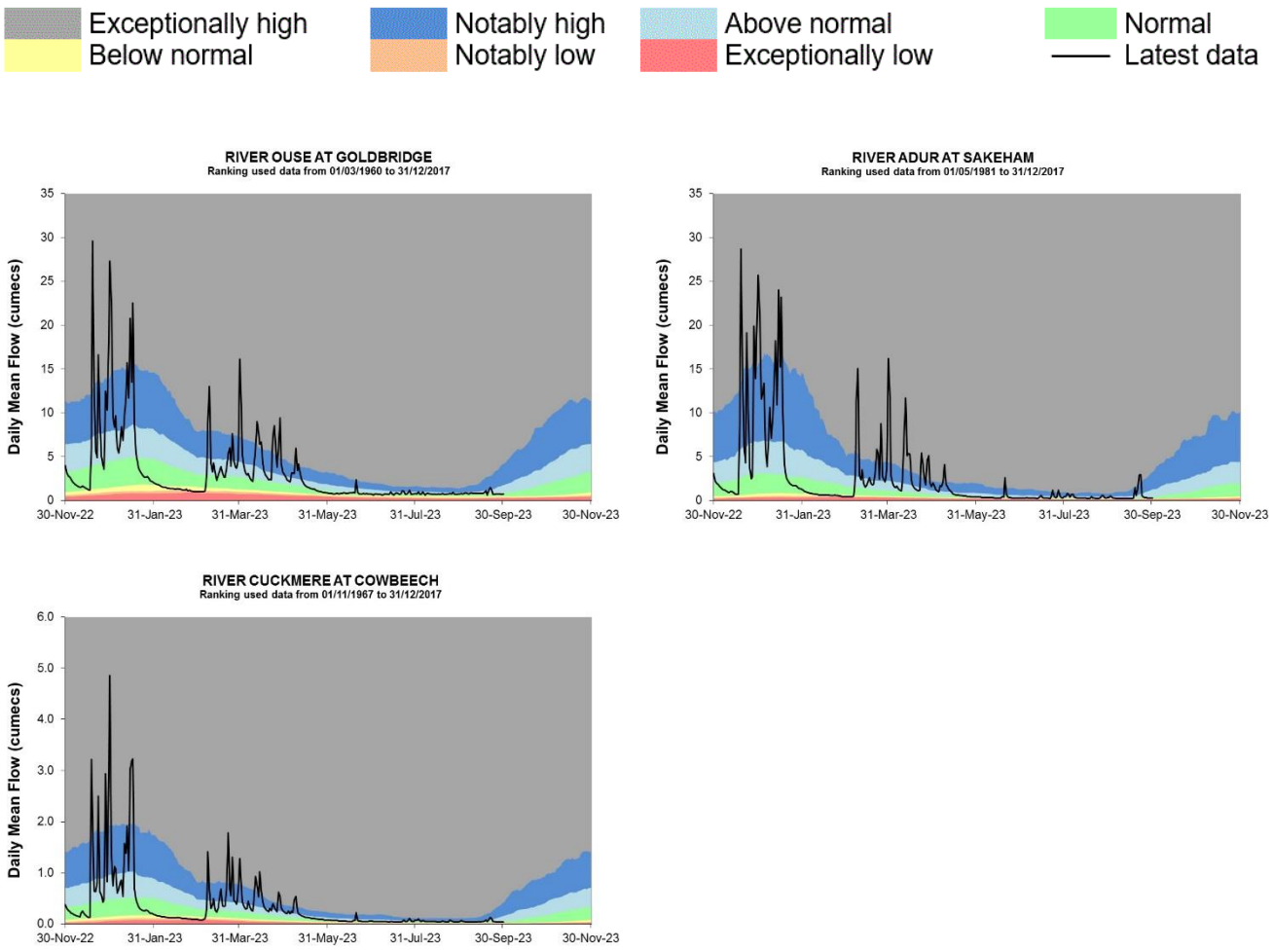
Figure 7.1: Monthly rainfall and effective rainfall totals for the past 12 months compared to the 1961 to 1990 long term average.



HadUK rainfall data. (Source: Met Office. Crown copyright, 2023).

7.2 East Sussex River flow charts

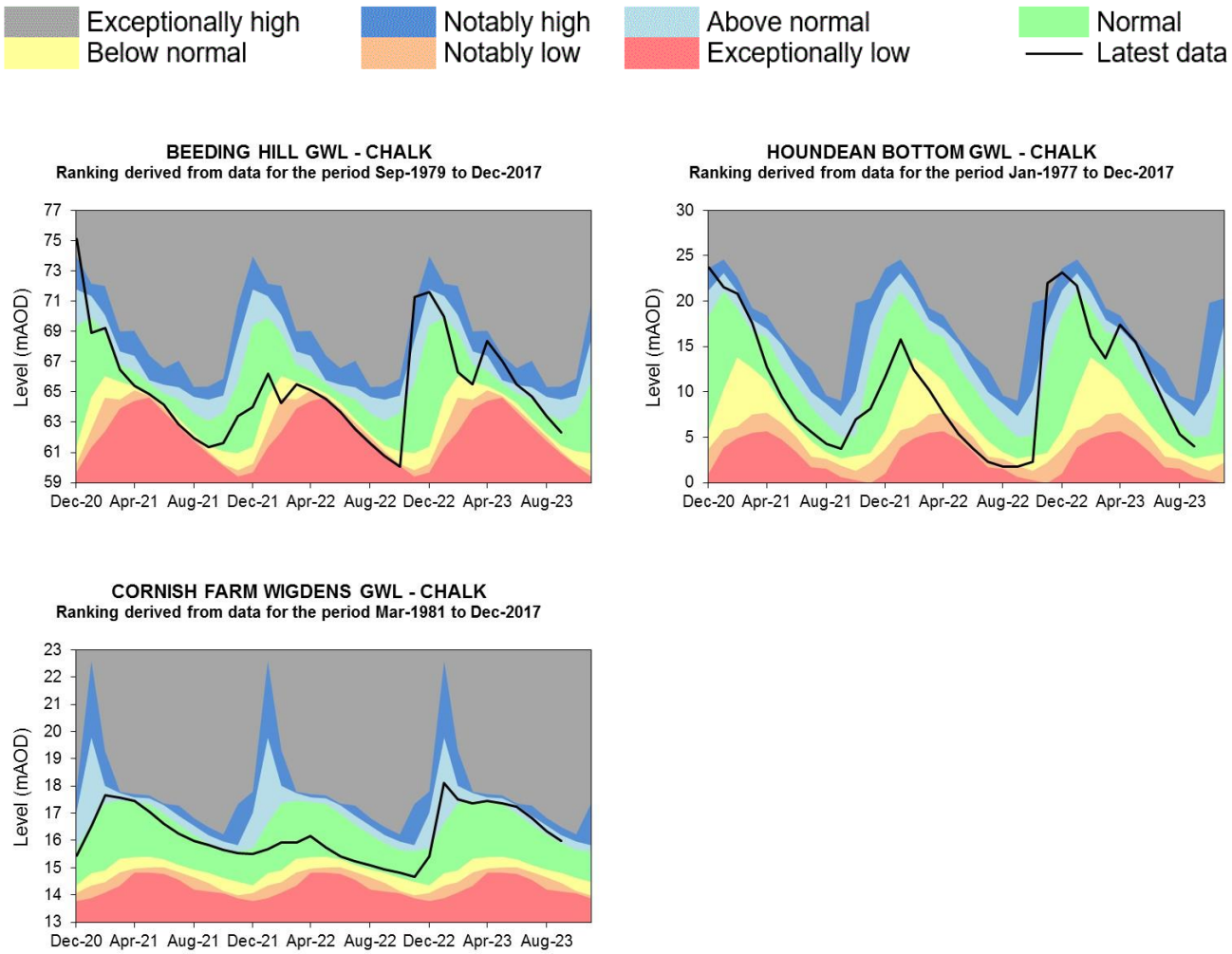
Figure 7.2: Daily mean river flow for index sites over the past year, compared to an analysis of historic daily mean flows, and long term maximum and minimum flows.



Source: Environment Agency, 2023.

7.3 East Sussex Groundwater level charts

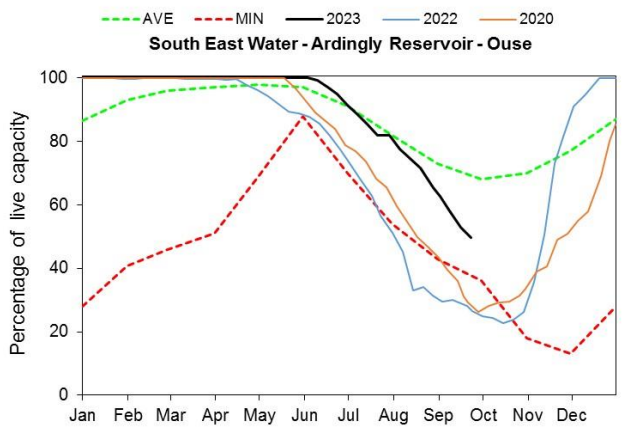
Figure 7.3: End of month groundwater levels at index groundwater level sites for major aquifers. 34 months compared to an analysis of historic end of month levels and long term maximum and minimum levels.

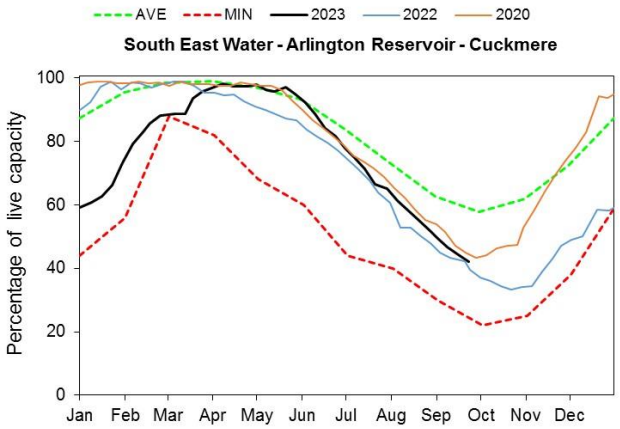


Source: Environment Agency, 2023.

8 Reservoir stocks

Figure 8.1: End of month 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).

9 Glossary

9.1 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).

9.2 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.

10 Appendices

10.1 Rainfall, effective rainfall and soil moisture deficit table

Figure 10.1: This is areal rainfall, effective rainfall (percolation or runoff) and soil moisture deficit for the hydrological areas across the SSD. 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 10.2

Hydrological Area	Rainfall (mm) 30 day Total	Rainfall September as %LTA	Effective Rainfall (mm) 30 day Total	Effective Rainfall September as %LTA	Soil Moisture Deficit (SMD) Day 30	SMD End of September LTA
Test Chalk	95	140%	12	131%	46	91
East Hampshire Chalk	81	105%	10	66%	65	82
West Sussex Chalk	70	89%	9	56%	79	78
East Sussex Chalk	61	84%	8	65%	85	83
Isle of Wight	62	88%	7	82%	90	97
Western Rother Greensand	79	100%	10	61%	73	79
Hampshire Tertiaries	72	103%	0	0%	65	88
Lymington	76	107%	0	0%	48	81
Sussex Coast	54	84%	0	0%	100	97
Arun	66	90%	0	0%	84	77
Adur	58	81%	0	0%	88	74
Ouse	59	81%	0	0%	79	70
Cuckmere	53	74%	0	0%	77	69
Pevensey Levels	44	64%	0	0%	95	79
SSD Average	66	92%	4	43%	77	82

10.2 Seasonal summary table of rainfall and effective rainfall

Summer season: 01/04/2023 to 30/09/2023

Hydrological Area	Seasonal Rainfall (mm) Total	Seasonal Rainfall as % LTA	Seasonal Effective Rainfall (mm) Total	Seasonal Effective Rainfall as % LTA
Test Chalk	475	137%	80	162%
East Hampshire Chalk	456	123%	84	134%
West Sussex Chalk	403	108%	77	109%
East Sussex Chalk	369	107%	57	102%
Isle of Wight	404	123%	63	133%
Western Rother Greensand	419	112%	80	113%
Hampshire Tertiaries	429	129%	39	185%
Lymington	441	131%	42	152%
Sussex Coast	333	109%	26	143%
Arun	351	100%	42	106%
Adur	334	97%	38	102%
Ouse	353	101%	38	96%
Cuckmere	345	102%	25	75%
Pevensey Levels	323	100%	20	86%
SSD Average	388	113%	51	119%

10.3 Rainfall banding table

Hydrological area	Sep 2023 band	Jul 2023 to Sep 2023 cumulative band	Apr 2023 to Sep 2023 cumulative band	Oct 2022 to Sep 2023 cumulative band
Test Chalk	Normal	Notably high	Above normal	Exceptionally high
East Hampshire Chalk	Normal	Above normal	Above normal	Exceptionally high
West Sussex Chalk	Normal	Normal	Normal	Notably high
East Sussex Chalk	Normal	Normal	Normal	Notably high
Isle of Wight	Normal	Normal	Normal	Exceptionally high
Western Rother Greensand	Normal	Normal	Normal	Exceptionally high
Hampshire Tertiaries	Normal	Normal	Normal	Exceptionally high
Lymington	Normal	Notably high	Above normal	Exceptionally high
Sussex Coast	Normal	Normal	Normal	Notably high
Arun	Normal	Normal	Normal	Exceptionally high
Adur	Above normal	Notably high	Notably high	Exceptionally high
Ouse	Normal	Normal	Normal	Exceptionally high
Cuckmere	Normal	Above normal	Above normal	Exceptionally high
Pevensey Levels	Normal	Normal	Normal	Notably high

10.4 River flows table

Site name	River	Catchment	Sep 2023 band	Aug 2023 band
Alfoldean Gs	Arun	Arun	Normal	Normal
Allbrook Gs+ Highbridge	Itchen (so)	Itchen	Exceptionally high	Exceptionally high
Blackwater	Medina	Isle of Wight	Above normal	Notably high
Broadlands	Test	Test Lower	Above normal	Above normal
Brockenhurst GS	Lymington	New Forest	Above normal	Normal
Chilbolton GS	Test	Test Upper	Above normal	Above normal
Cowbeech Gs	Cuckmere	Cuckmere	Normal	Above normal
Goldbridge Gs	Ouse [so]	Ouse Sussex	Above normal	Normal
Iping Mill Gs	Rother	West Rother	Above normal	Notably high
Mislingford GS	Meon	Meon	Normal	Above normal
North Fareham GS	Wallington	Wallington	Normal	Normal
Sakeham GS	Adur	Adur	Above normal	Normal

10.5 Groundwater table

Site name	Aquifer	End of Sep 2023 band	End of Aug 2023 band
Houndean Bottom Gwl	Brighton Chalk Block	Normal	Normal
Chilgrove House Gwl	Chichester-Worthing-Portsdown Chalk	Normal	Normal
Carisbrooke Castle	Isle Of Wight Central Downs Chalk	Above normal	Above normal
West Meon Hut Gwl	River Itchen Chalk	Above normal	Above normal
Clanville Gate Gwl	River Test Chalk	Notably high	Notably high
Lopcombe Corner Gwl	River Test Chalk	Notably high	Above normal
Beeding Hill Gwl	Brighton Chalk Block	Normal	Normal
Catherington	River Meon Chalk	Above normal	Above normal
Cornish Wigdens Gwtr	Eastbourne Chalk Block	Above normal	Above normal
Harting Common Down	Western Rother Lower Greensand	Normal	Normal
Preston Candover	River Itchen Chalk	Notably high	Notably high
Youngwoods Copse	Isle of Wight Lower Greensand	Above normal	Normal

10.6 Abstraction licence flow constraints

Number of flow constraints in force between 1 to 2 September 2023	Number of flow constraints in force between 3 to 9 September 2023	Number of flow constraints in force between 10 to 16 September 2023	Number of flow constraints in force between 17 to 23 September 2023	Number of flow constraints in force between 24 to 30 September 2023
4	4	5	4	**3**

10.7 Solent and South Downs Areal Rainfall Units Map

10.8 SSD Areal Rainfall Monthly Long Term Averages

Hydrological Area	Jan LTA mm	Feb LTA mm	Mar LTA mm	Apr LTA mm	May LTA mm	Jun LTA mm	Jul LTA mm	Aug LTA mm	Sep LTA mm	Oct LTA mm	Nov LTA mm	Dec LTA mm
Test Chalk	85	58	69	52	59	58	48	63	68	75	78	89
East Hampshire Chalk	94	63	74	56	62	59	52	65	77	86	90	95
West Sussex Chalk	93	63	74	60	60	58	51	65	79	92	97	95
East Sussex Chalk	87	57	65	54	52	58	49	60	73	93	98	89
Isle of Wight	88	60	67	52	53	50	44	58	70	84	91	88
Western Rother Greensand	100	65	76	61	63	57	51	66	79	91	95	100
Hampshire Tertiaries	86	59	67	50	57	53	45	59	70	79	83	87
Lymington	89	61	68	52	58	54	44	60	71	83	87	92
Sussex Coast	77	51	61	50	50	48	42	53	64	77	81	79
Arun	85	55	66	56	58	56	48	59	72	81	84	87
Adur	85	55	64	55	56	56	46	60	72	86	89	86
Ouse	87	56	64	54	54	59	49	60	73	89	93	88
Cuckmere	85	55	62	51	50	58	49	60	72	91	94	85
Pevensey Levels	82	54	61	51	47	52	47	56	69	88	94	82
SSD Average	**87**	**58**	**67**	**54**	**56**	**55**	**47**	**60**	**72**	**85**	**90**	**89**