Monthly water situation report: Lincolnshire and Northamptonshire Area

1 Summary - June 2024

Following nine months of consecutive above average rainfall, Lincolnshire and Northamptonshire area received below average rainfall of 31mm, which was 58% of the long term average (LTA). Rainfall for June across the area ranged from 20mm to 49mm (37%-88% of the LTA), meaning the catchments received below normal to normal rainfall for the time of year. As a result of the below average rainfall and increasing temperatures, there was a general trend of increasing soil moisture deficits (SMD) across the six catchments, with all sites having normal levels for the time of year. Mean monthly river flows ranged from 68% to 237% of their LTA's, and from normal to notably high classification. Despite below normal levels of rainfall and normal levels of SMD across the area in June, groundwater remained high, but trend showed a slight decline at all indicator sites. Reservoirs in the area ended the month either at or above their normal operating curves.

1.1 Rainfall

June was a drier than average month, the Lincolnshire and Northamptonshire area received below average rainfall of 31mm, which was 58% of the LTA. A large amount of June's rainfall fell in the second week of the month. Rainfall for June across the area ranged from 20mm to 49mm (37%-88% of the LTA), meaning the catchments received below normal to normal rainfall for the time of year. The rainfall showed a North-South divide, with the two most southern catchments receiving below normal rainfall whilst the remaining four catchments experienced normal levels of rainfall. The highest totals from this event were in the north which led to the monthly totals being higher in the north than in the south. The rainfall totals for the past 3 months have now dropped into the normal category for all catchments. The North-South divide is also observed in the 6 Months total which showed the Northern catchments receiving notably high rainfall whilst the two most southern catchments have received exceptionally high levels of rainfall. The record breaking rainfall totals over winter are still having an impact on the long term analysis with the last 12 months rainfall totals in all catchments still being exceptionally high during these periods.

1.2 Soil moisture deficit and recharge

As a result of the below average rainfall and increasing temperatures, there was a general trend of increasing SMD across the six catchments, with all sites having normal levels for the time of

year. The area as a whole ended the month with SMD of 84mm, compared to 27mm at the end of May.

1.3 River flows

Monthly mean river flows ranged from 68% to 237% of their long-term averages, and from normal to notably high classification. In most sites river flow responded in line with the amount of rainfall received in June. One of the ten sites was considered to be notably high, three at normal levels while the remaining six sites were classified as above normal.

1.4 Groundwater levels

Despite below normal levels of rainfall and normal levels of SMD across the area in June, groundwater remained high, but the trend showed a slight decline at all indicator sites. Overall, at all sites with data, groundwater levels were classified as above normal to notably high for the time of year.

1.5 Reservoir stocks

All reservoirs in the area ended the month either at or above their normal operating curves.

1.6 Environmental impact

All transfer schemes remained off throughout June. No licence cessations were issued.

1.7 Forward look

1.7.1 Probabilistic ensemble projections for river flows at key sites

September 2024: There is an increased probability of normal or higher flows with none of modelled rainfall scenarios showing notably low levels at Nene Northampton and Nene Wansford.

December 2024: All sites are showing a decreased probability of river flows being notably low or exceptionally low.

1.7.2 Probabilistic ensemble projections for groundwater levels in key aquifers

September 2024: All sites are showing an increased probability of groundwater levels being normal or higher with none of modelled rainfall scenarios showing below normal to exceptionally low levels.

March 2025: All sites are showing a decreased probability of groundwater levels being notably low or exceptionally low.

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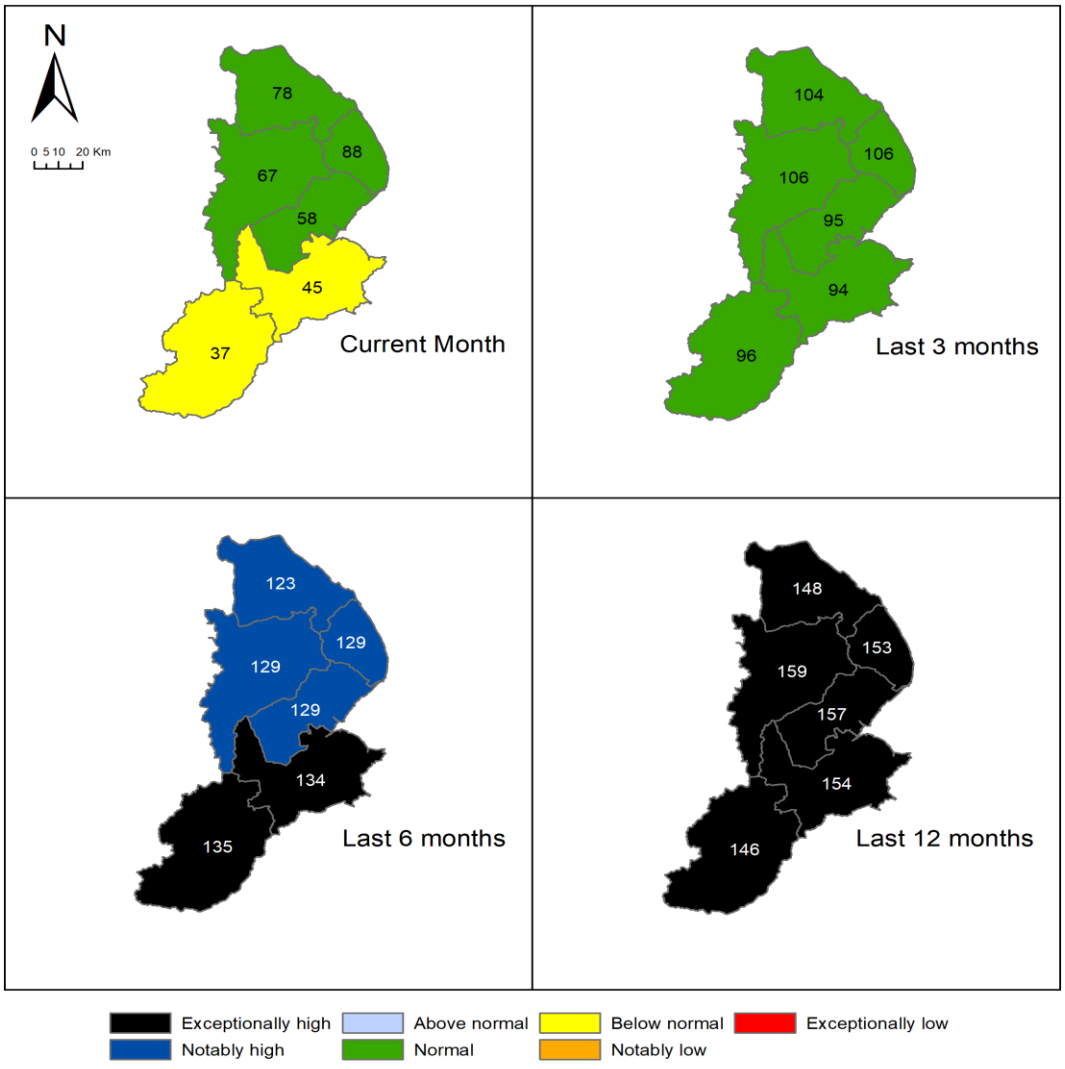
2 Rainfall

2.1 Rainfall map

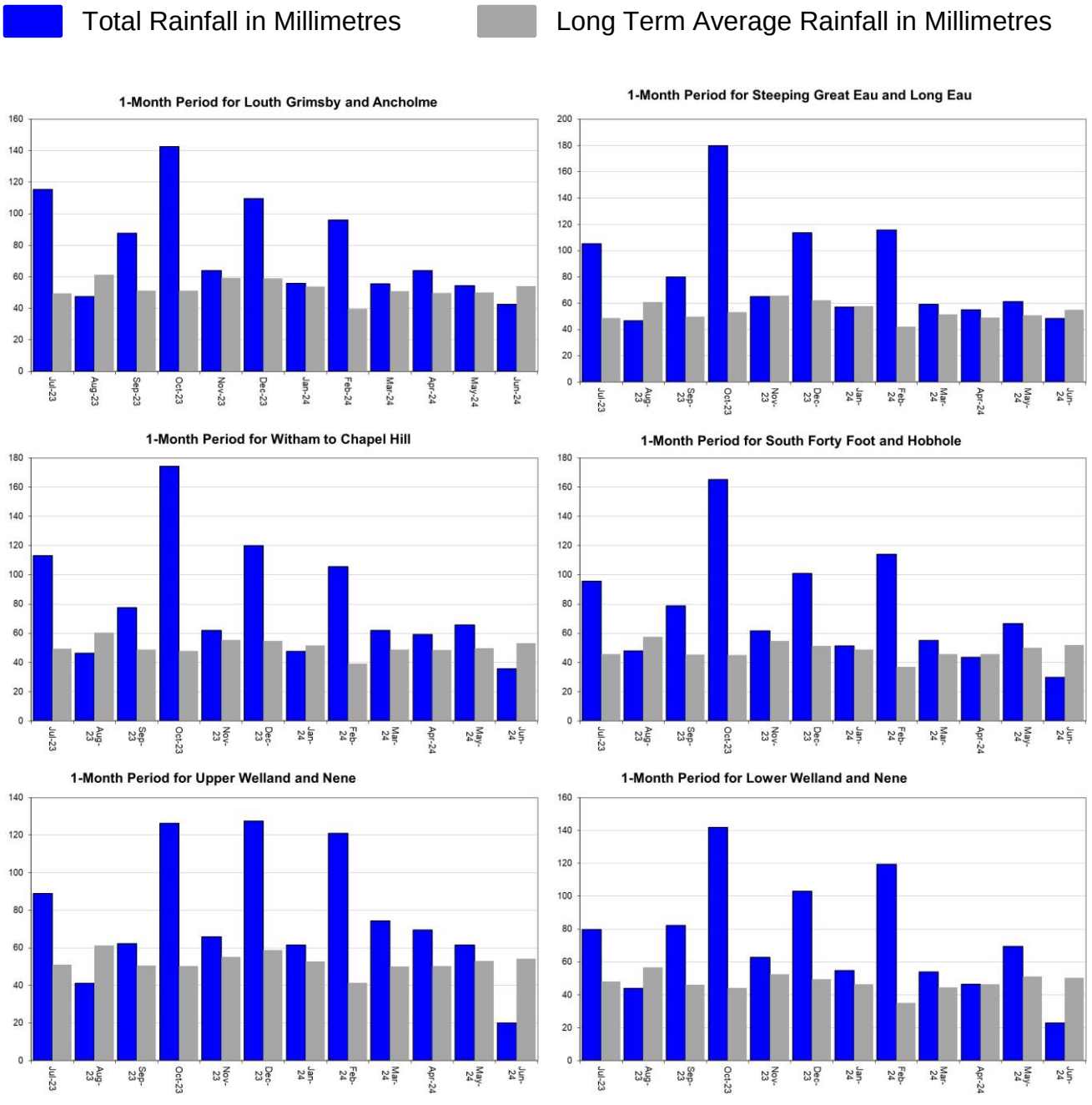
Figure 2.1: Total rainfall for hydrological areas across Lincolnshire and Northamptonshire, expressed as a percentage of long term average rainfall for the current month (up to 30 June 2024), the last 3 months, the last 6 months, and the last 12 months. Category classes are based on an analysis of respective 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. Crown copyright. All rights reserved. Environment Agency, 100024198, 2024.

2.2 Rainfall charts

Figure 2.2: Monthly rainfall totals for the past 12 months as a percentage of the 1961 to 1990 long term average for each region and for England.

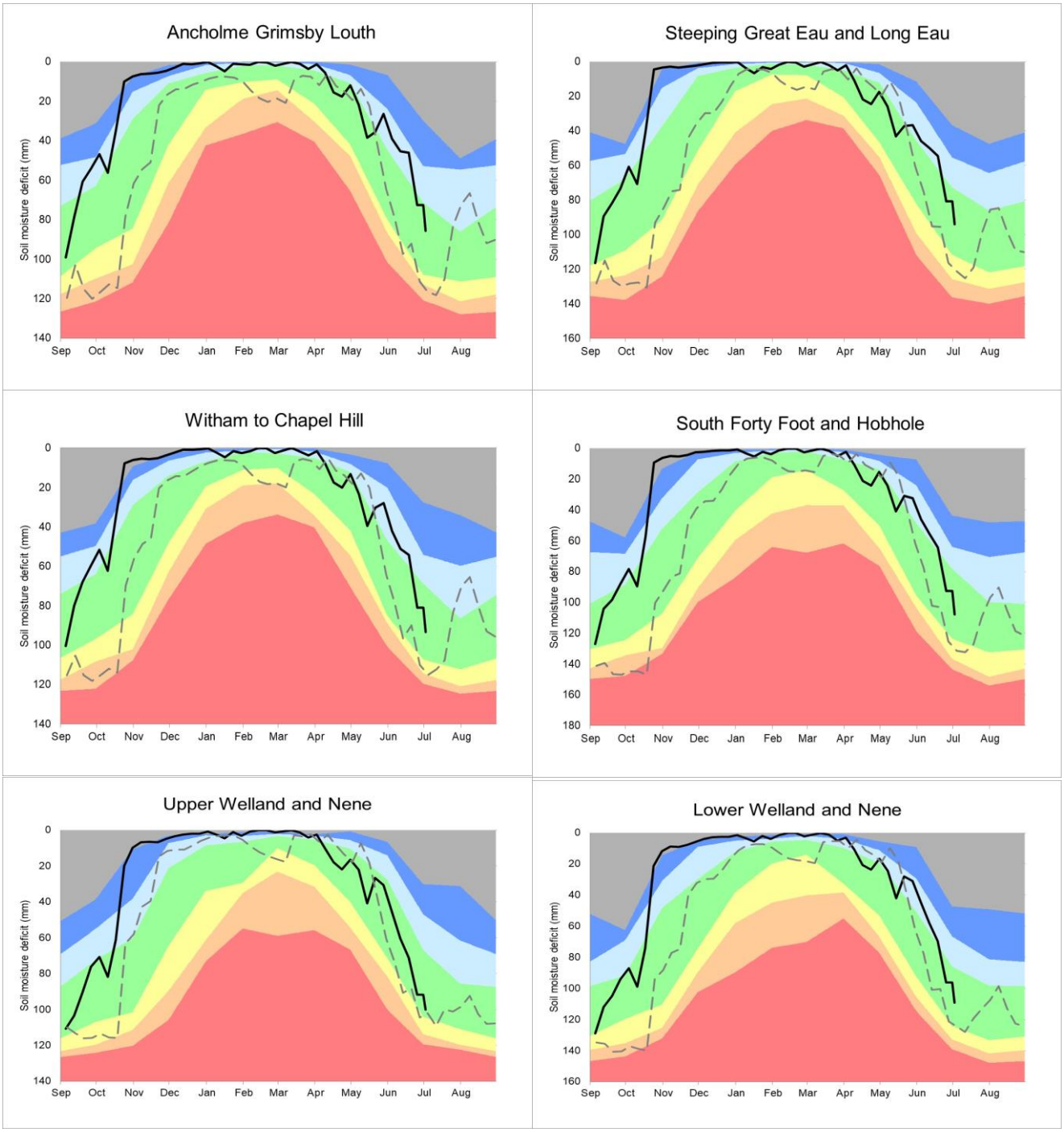


HadUK rainfall data. (Source: Met Office. Crown copyright, 2024).

3 Soil moisture deficit

3.1 Soil moisture deficit charts

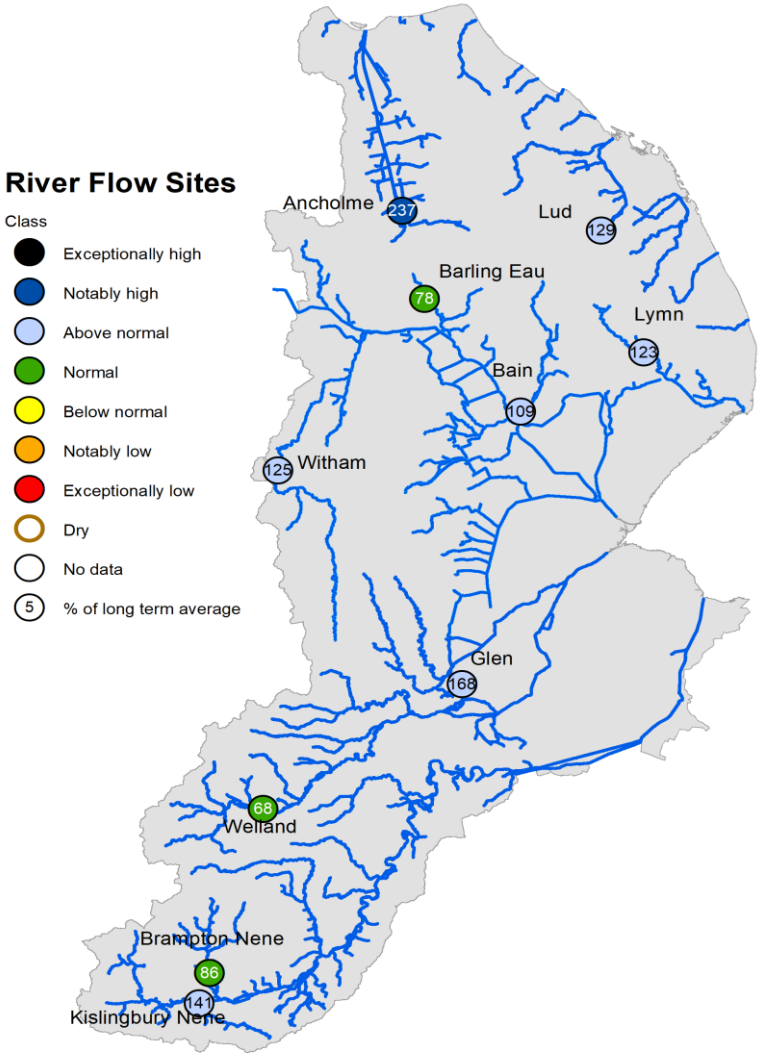
Figure 3.1: Latest soil moisture deficit compared to an analysis of historic 1961 to 1990 long term data set. Weekly MORECS data for real land use.



4 River flows

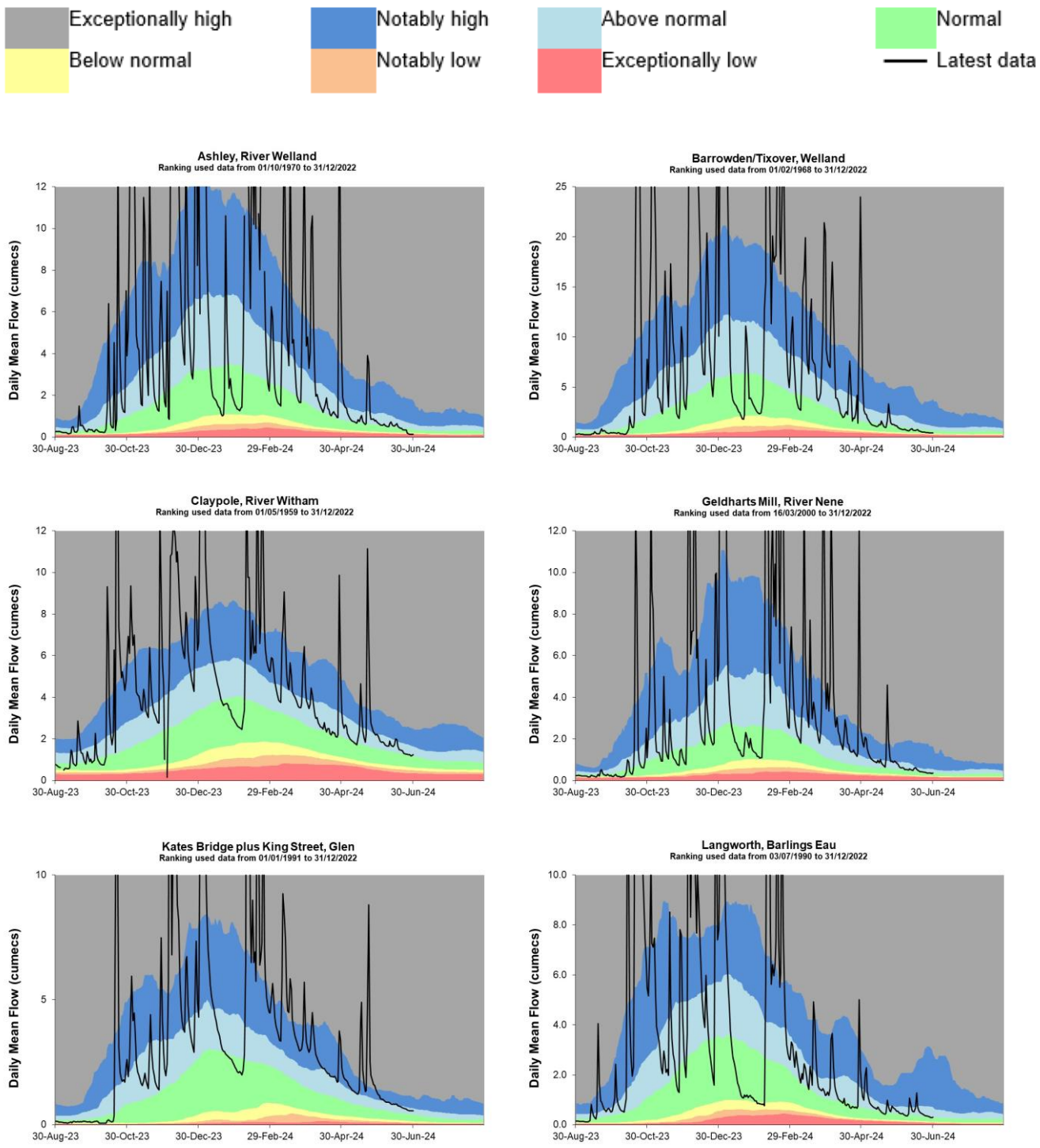
4.1 River flows map

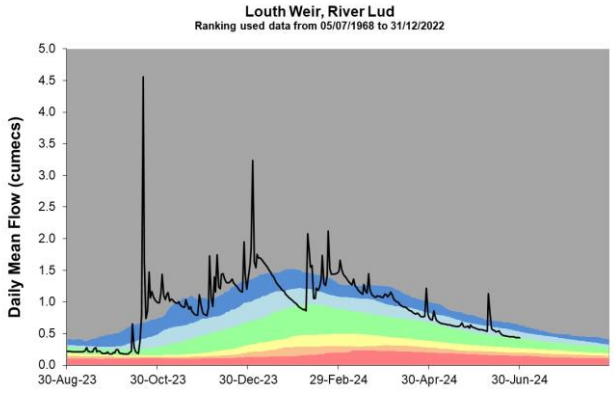
Figure 4.1: Monthly mean river flow for indicator sites for June 2024, expressed as a percentage of the respective long term average and classed relative to an analysis of historic June monthly means Table available in the appendices with detailed information.

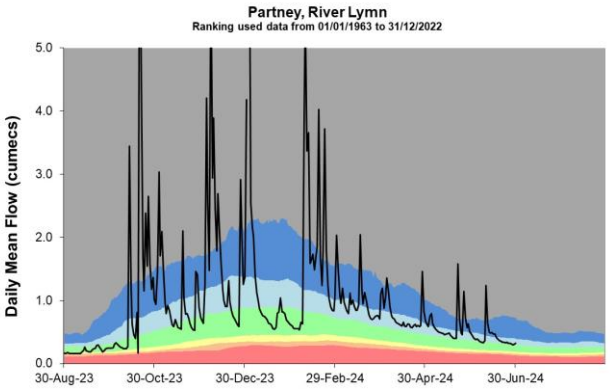


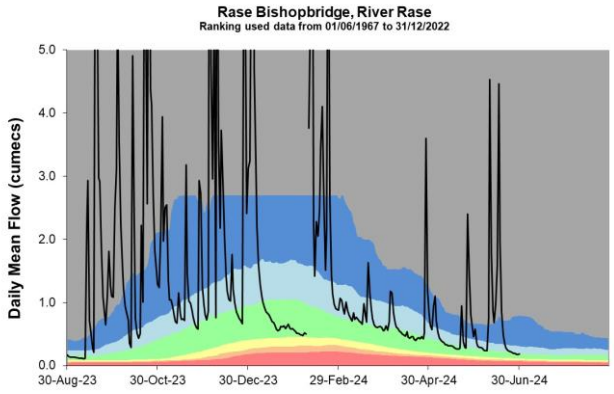
4.2 River flow charts

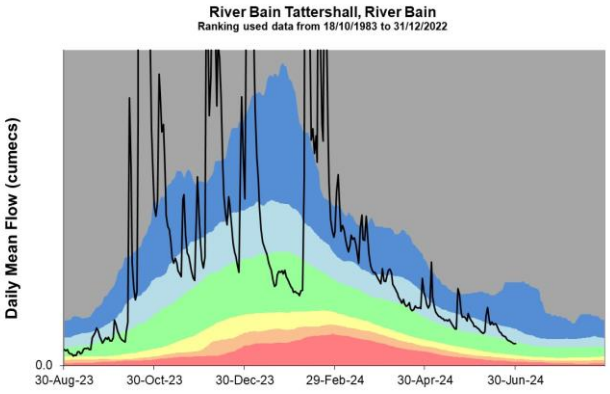
Figure 4.2: Daily mean river flow for index sites over the past year, compared to an analysis of historic daily mean flows, and long term maximum and minimum flows.

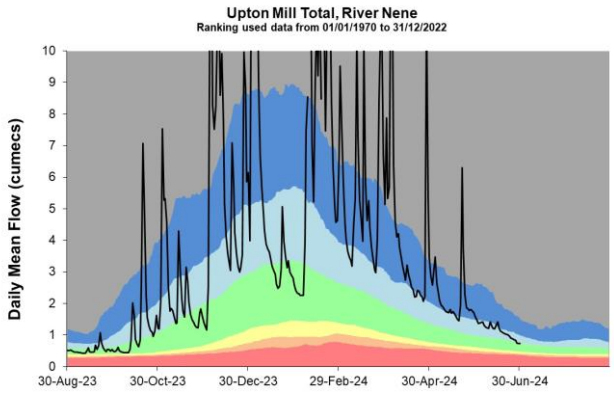


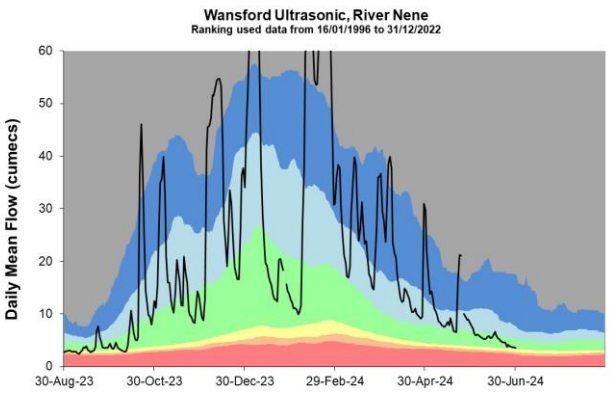










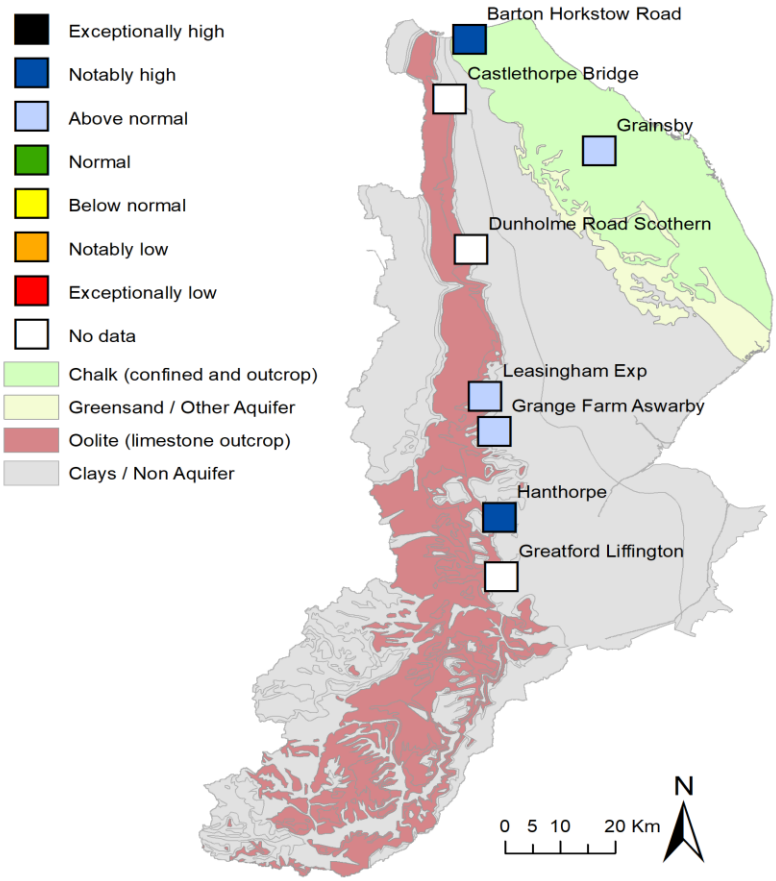


Source: Environment Agency.

5 Groundwater levels

5.1 Groundwater levels map

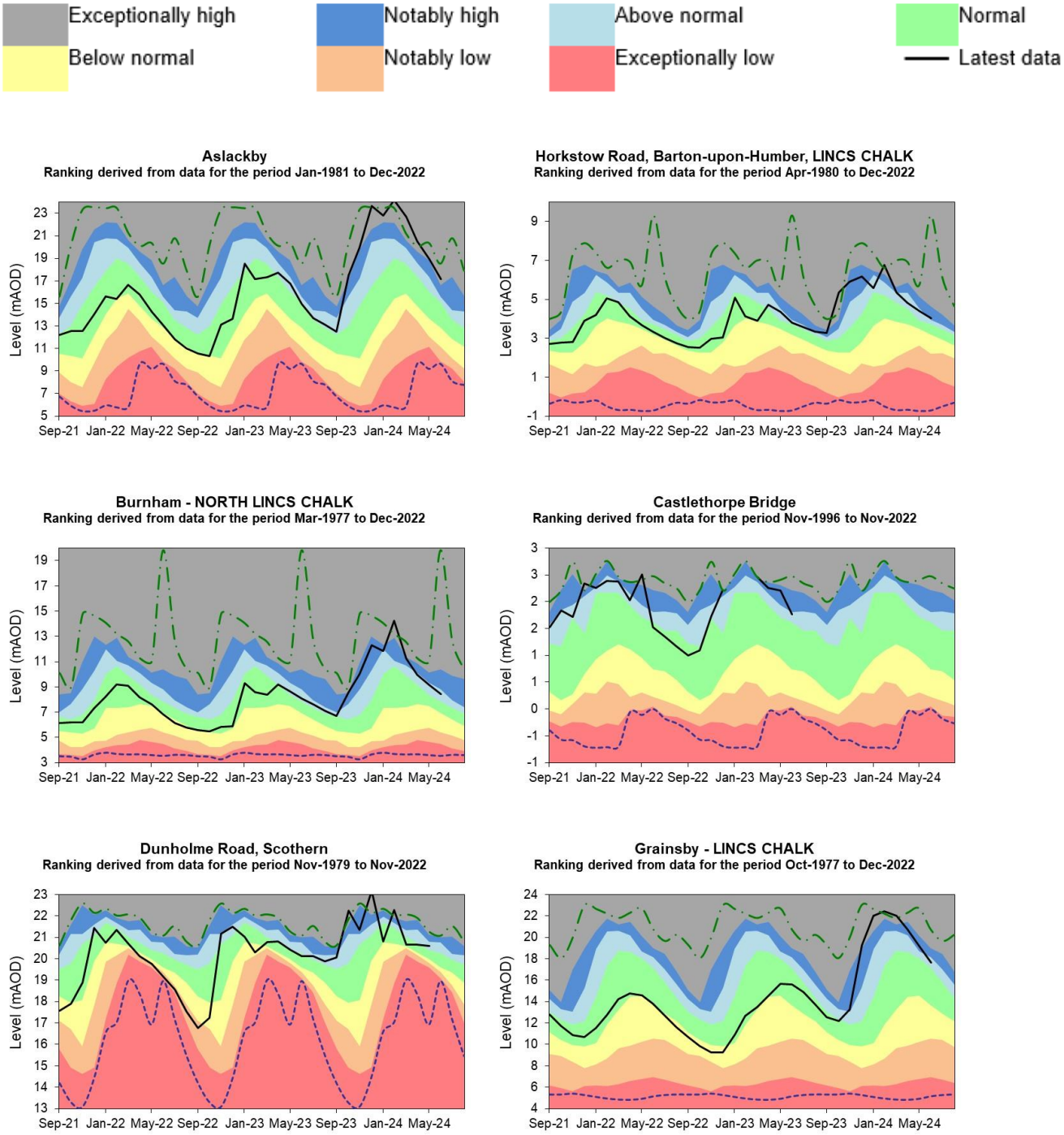
Figure 5.1: Groundwater levels for indicator sites at the end of June 2024, classed relative to an analysis of respective historic June levels. Table available in the appendices with detailed information.

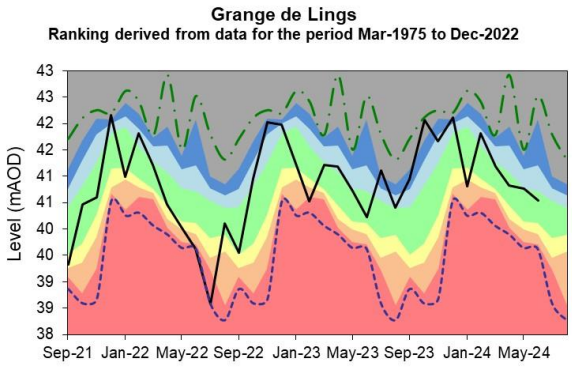


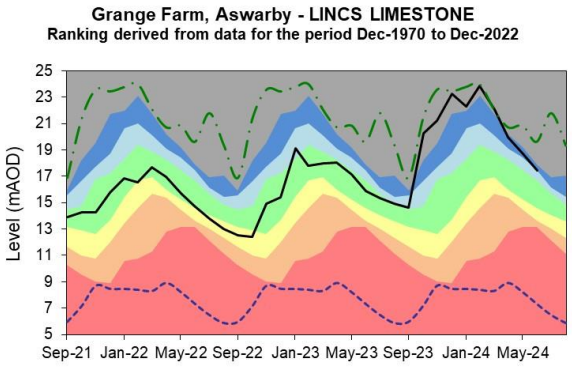
(Source: Environment Agency). Geological map reproduced with kind permission from UK Groundwater Forum, BGS copyright NERC. Crown copyright. All rights reserved. Environment Agency, 100024198, 2024.

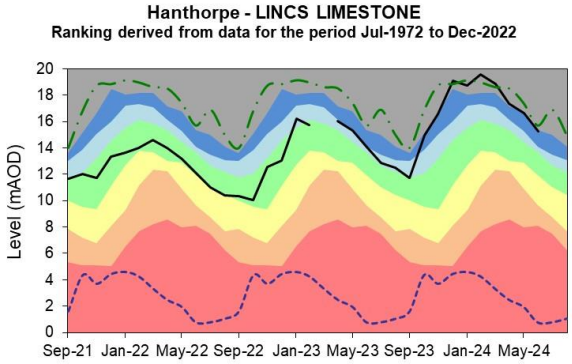
5.2 Groundwater level charts

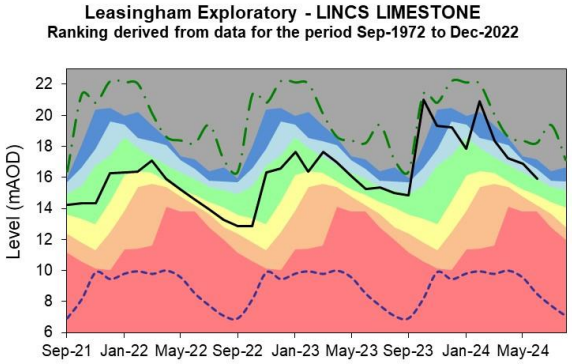
Figure 5.2: End of month groundwater levels at index groundwater level sites for major aquifers. 22 months compared to an analysis of historic end of month levels and long term maximum and minimum levels.







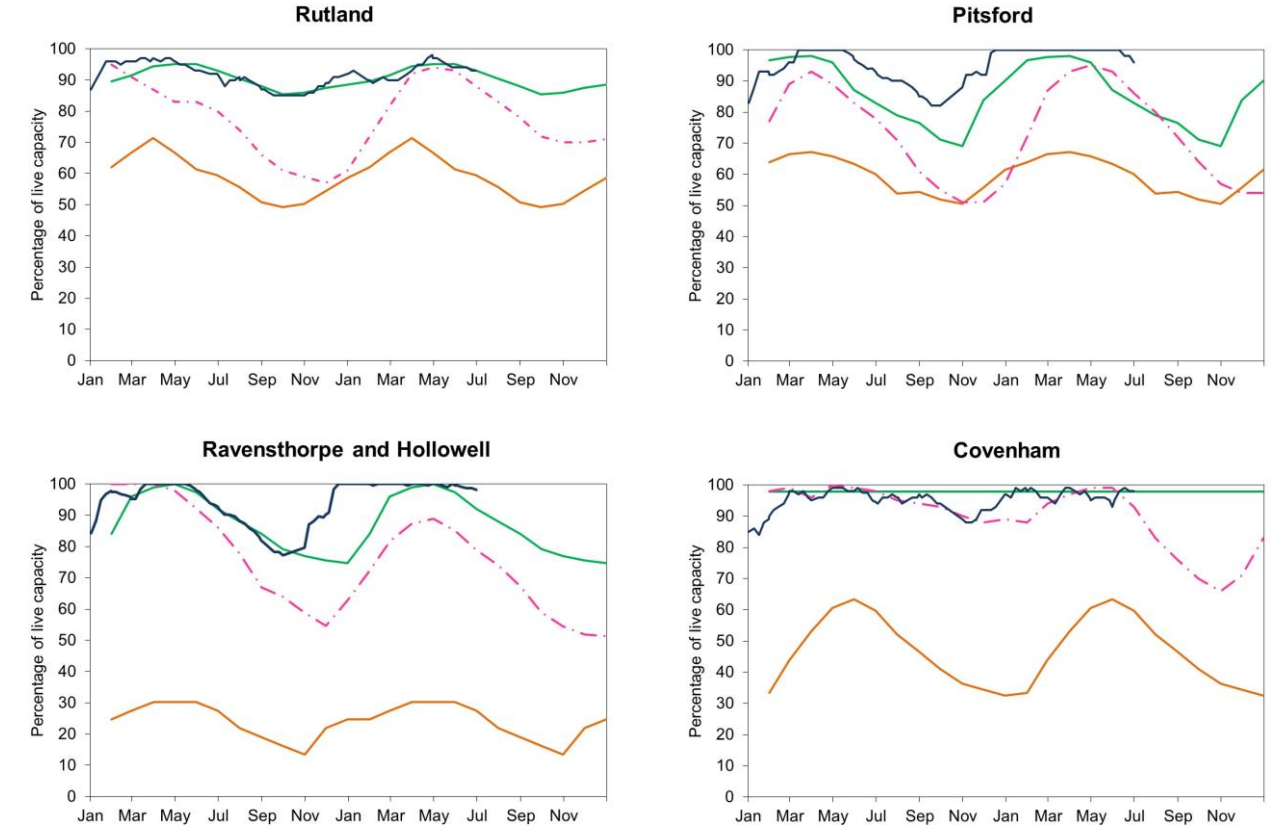




Source: Environment Agency, 2024.

6 Reservoir stocks

Figure 6.1: End of month regional reservoir stocks compared to the normal operating curve, drought curve and dry 1995-1996 stocks. Note: Historic records of individual reservoirs and reservoir groups making up the regional values vary in length

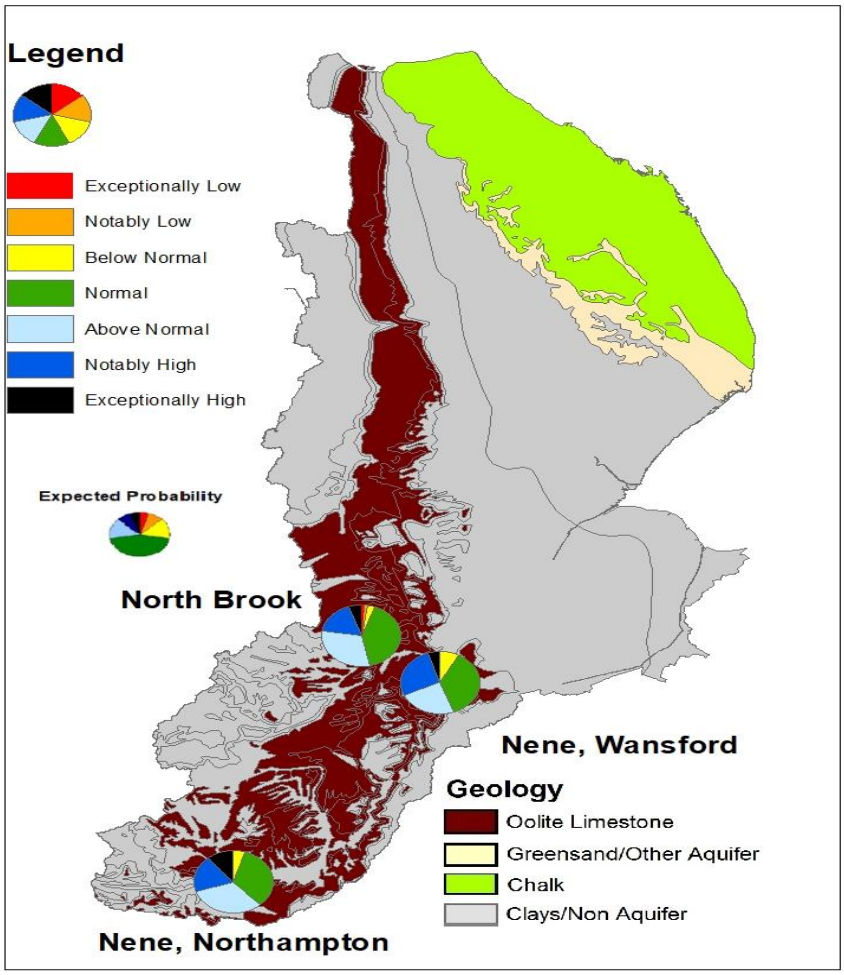


(Source: water companies).

7 Forward Look

7.1 Probabilistic ensemble projection of river flows at key sites in September 2024

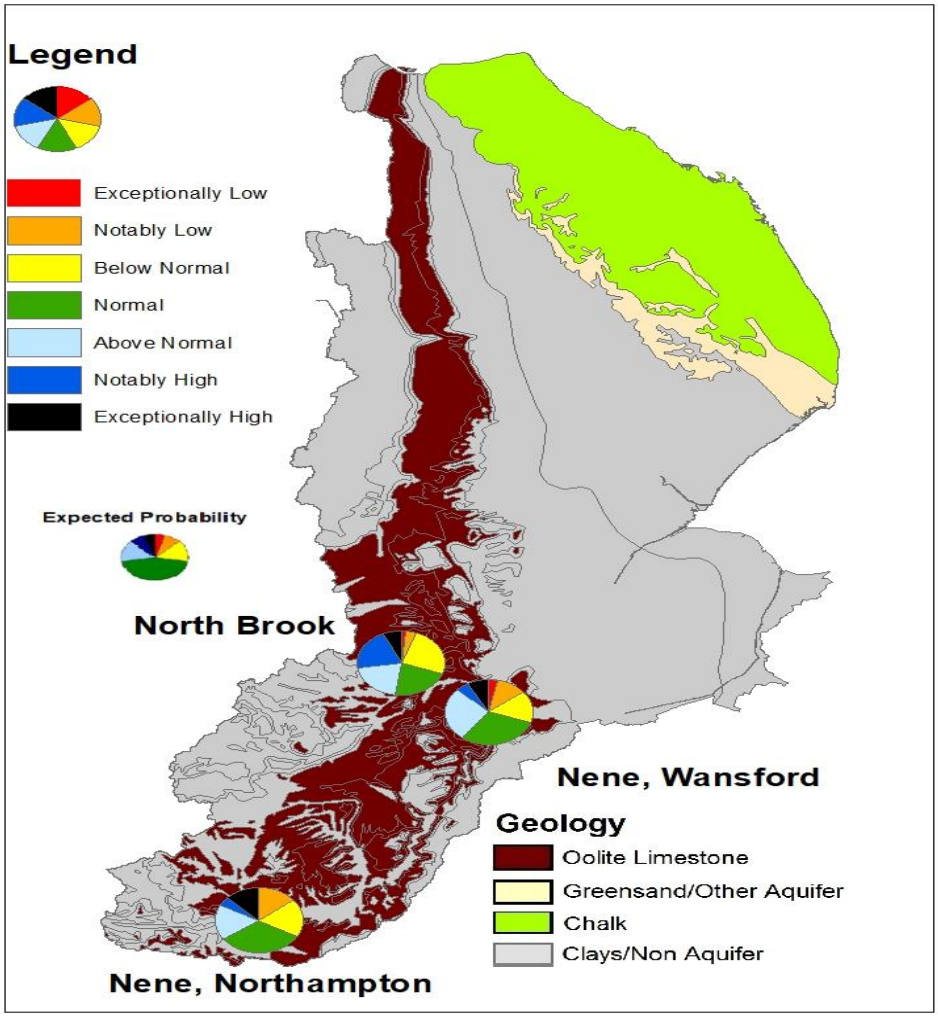
Table available in the appendices with detailed information. Exceptionally high or low levels are those which would typically occur 5% of the time within the historic record. Notably high or low levels are those which would typically occur 8% of the time. Above normal or below normal levels are those which would typically occur 15% of the time. Normal levels are those which would typically occur 44% of the tme within the historic record.



Pie charts indicate probability, based on climatology, of the surface water flow at each site being, for example, exceptionally low for the time of year. (Source: Centre for Ecology and Hydrology, Environment Agency) Geological map reproduced with kind permission from UK Groundwater Forum, BGS © NERC. Crown copyright. All rights reserved. Environment Agency, 100026380, 2024.

7.2 Probabilistic ensemble projection of river flows at key sites in December 2024

Table available in the appendices with detailed information. Exceptionally high or low levels are those which would typically occur 5% of the time within the historic record. Notably high or low levels are those which would typically occur 8% of the time. Above normal or below normal levels are those which would typically occur 15% of the time. Normal levels are those which would typically occur 44% of the time within the historic record.



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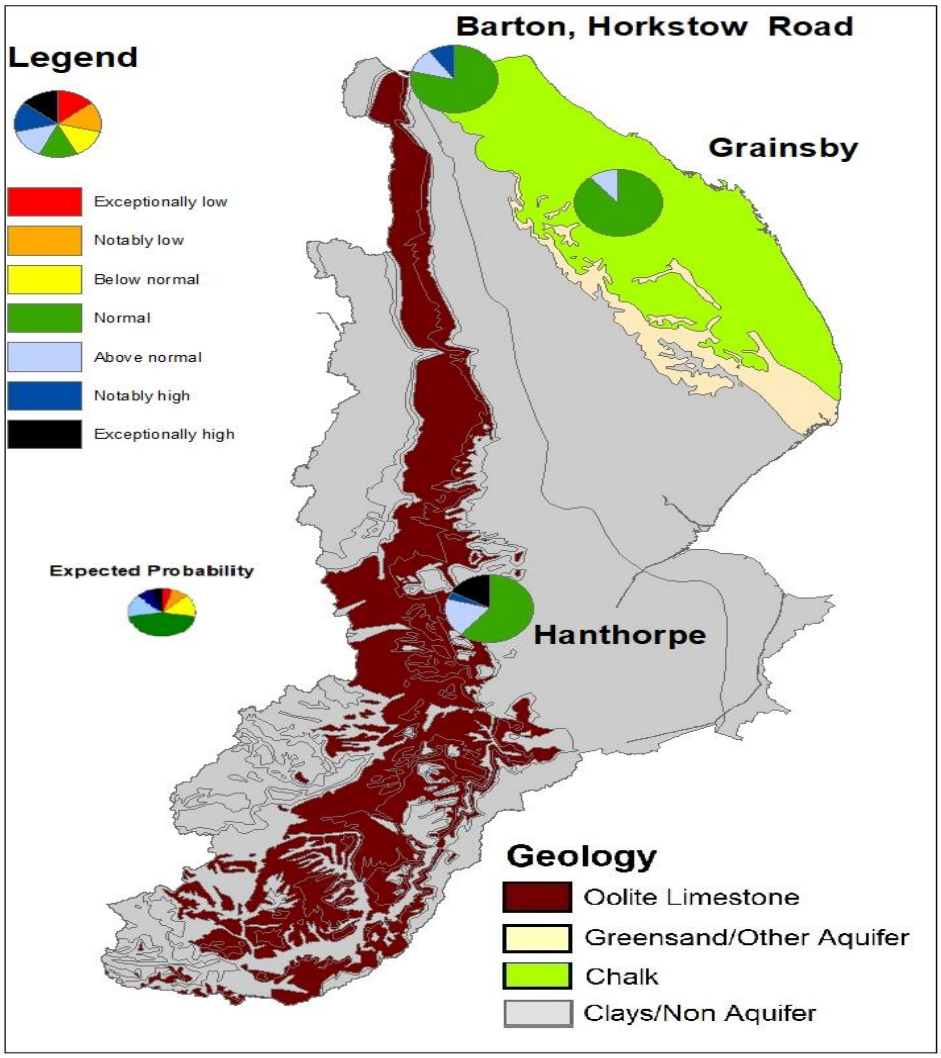
7.3 Probabilistic ensemble projection of groundwater levels at key sites in September 2024

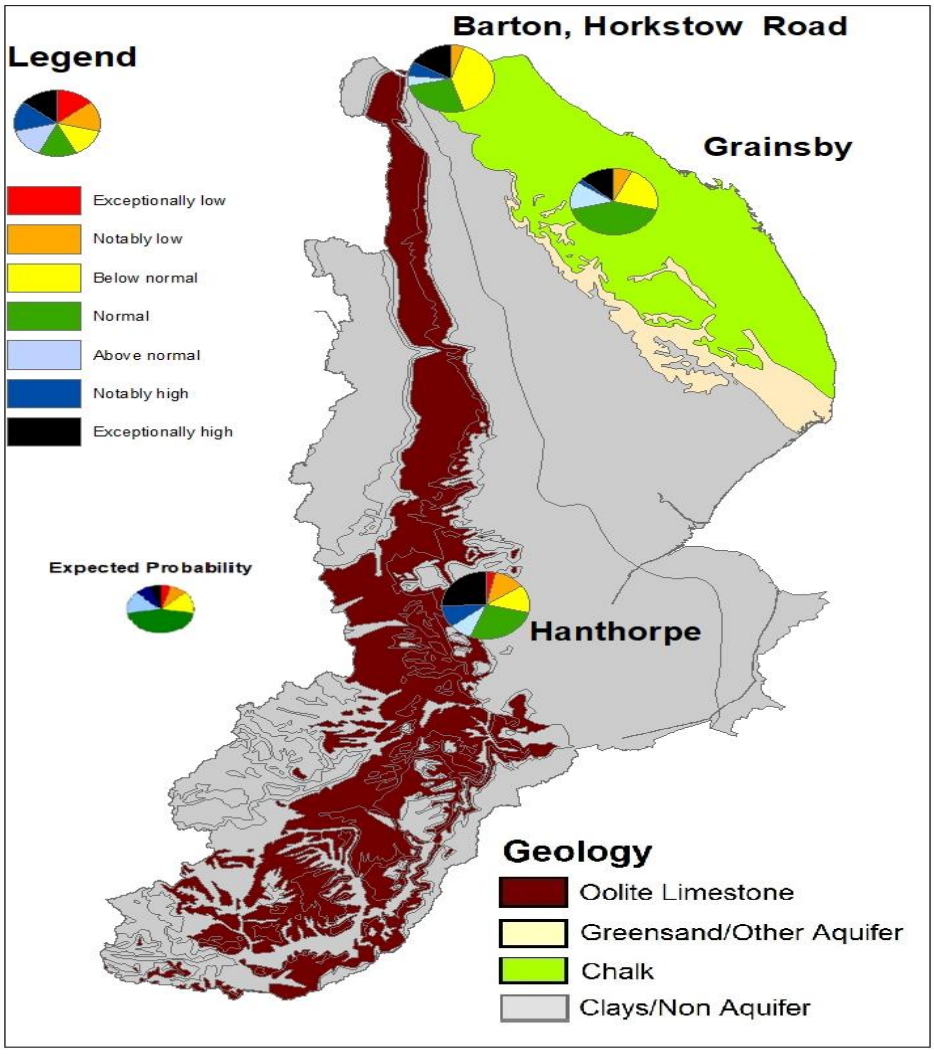
Table available in the appendices with detailed information. Exceptionally high or low levels are those which would typically occur 5% of the time within the historic record. Notably high or low levels are those which would typically occur 8% of the time. Above normal or below normal levels are those which would typically occur 15% of the time. Normal levels are those which would typically occur 44% of the time within the historic record.



Pie charts indicate probability, based on climatology, of the groundwater level at each site being, for example, exceptionally low for the time of year. (Source: Environment Agency)
Geological map reproduced with kind permission from UK Groundwater Forum, BGS © NERC. Crown copyright. All rights reserved. Environment Agency, 100026380, 2024

7.4 Probabilistic ensemble projection of groundwater levels at key sites in March 2025

Table available in the appendices with detailed information. Exceptionally high or low levels are those which would typically occur 5% of the time within the historic record. Notably high or low levels are those which would typically occur 8% of the time. Above normal or below normal levels are those which would typically occur 15% of the time. Normal levels are those which would typically occur 44% of the time within the historic record.



Pie charts indicate probability, based on climatology, of the groundwater level at each site being, for example, exceptionally low for the time of year. (Source: Environment Agency)

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	Jun 2024 rainfall % of long term average 1961 to 1990	Jun 2024 band	Apr 2024 to June cumulative band	Jan 2024 to June cumulative band	Jul 2023 to June cumulative band
Louth Grimsby And Ancholme	78	Normal	Normal	Notably high	Exceptionally high
Lower Welland And Nene	45	Below Normal	Normal	Exceptionally high	Exceptionally high
South Forty Foot And Hobhole	58	Normal	Normal	Notably high	Exceptionally high
Steeping Great Eau And Long Eau	88	Normal	Normal	Notably high	Exceptionally high
Upper Welland And Nene	37	Below Normal	Normal	Exceptionally high	Exceptionally high
Witham To Chapel Hill	67	Normal	Normal	Notably high	Exceptionally high

9.2 River flows table

Site name	River	Catchment	Jun 2024 band	May 2024 band
Ashley	Welland Mkt.harb-rockinghm	Welland Rockingham	Normal	Above normal
Barrowden/tixover	Welland (rockingham To Stamford)	Welland Stamford	Normal	Above normal
Claypole	Upper Witham	Witham Bargate Upper	Above normal	Above normal
Geldharts Mill	Nene (brampton Branch)	Nene Brampton Bridge	Normal	Notably high
Kates Bridge Plus King Street	Glen (an)	Welland and Glen	Above normal	Exceptionally high
Langworth	Barlings Eau	Barlings Eau	Normal	Above normal
Louth Weir	Lud	Louth Canal	Above normal	Above normal
Partney	Lymn & Steeping	Lymn Steeping	Above normal	Above normal
Rase Bishopbridge	Ancholme	Ancholme W Mid	Notably high	Above normal
Upton Mill Total	Nene (kislingbury Branch)	Nene Kislingbry Bridge	Above normal	Notably high

Wansford Combined	Nene (wollaston To Wansford)	Nene Wansford	Normal	Above normal

9.3 Groundwater table

Site name	Aquifer	End of Jun 2024 band	End of May 2024 band
Barton-upon-humber	Grimsby Ancholme Louth Chalk	Notably high	Above normal
Castlethorpe Bridge	Grimsby Ancholme Louth Limestone		
Dunholme Road, Scothern	Grimsby Ancholme Louth Limestone		Above normal
Grainsby	Grimsby Ancholme Louth Chalk	Above normal	Notably high
Grange Farm, Aswarby	Central Lincs Limestone?	Above normal	Notably high
Hanthorpe	Cornbrash (south)	Notably high	Notably high
Leasingham Exploratory	Blisworth Limestone Rutland Formation (south)?	Above normal	Above normal

9.4 Ensemble projections tables

9.4.1 Probabilistic ensemble projection of river flows at key sites in September 2024

Percentage of pie chart for each band

Site	Nene Nton	Nene Wansford	North Brook
Exceptionally low	0.0	0.0	1.3
Notably low	0.0	0.0	1.3
Below normal	4.8	7.9	2.7
Normal	33.3	36.5	41.3
Above normal	31.7	23.8	30.7
Notably high	19.0	27.0	17.3
Exceptionally high	11.1	4.8	5.3

9.4.2 Probabilistic ensemble projection of river flows at key sites in December 2024

Percentage of pie chart for each band

Site	Nene Nton	Nene Wansford	North Brook
Exceptionally low	0.0	3.2	1.4
Notably low	14.3	11.1	4.1
Below normal	19.0	15.9	24.7
Normal	31.7	30.2	21.9
Above normal	17.5	27.0	20.5
Notably high	4.8	4.8	20.5
Exceptionally high	12.7	7.9	6.8

9.4.3 Probabilistic ensemble projection of groundwater levels at key sites in September 2024

Percentage of pie chart for each band

Site	Grainsby	Hanthorpe	Horkstow
Exceptionally low	0.0	0.0	0.0
Notably low	0.0	0.0	0.0
Below normal	0.0	0.0	0.0
Normal	88.9	61.0	78.6
Above normal	11.1	18.6	11.9
Notably high	0.0	3.4	9.5
Exceptionally high	0.0	16.9	0.0

9.4.4 Probabilistic ensemble projection of groundwater levels at key sites in March 2025

Percentage of pie chart for each band

Site	Grainsby	Hanthorpe	Horkstow
Exceptionally low	0.0	3.4	0.0
Notably low	6.7	11.9	4.8
Below normal	22.2	13.6	40.5
Normal	42.2	27.1	26.2
Above normal	13.3	8.5	4.8
Notably high	2.2	10.2	7.1
Exceptionally high	13.3	25.4	16.7