Monthly water situation report: Lincolnshire and Northamptonshire Area

1 Summary - November 2024

In general, November, like October, seemed a very typical month. The Lincolnshire and Northamptonshire area received an average rainfall of 58mm in November, which was 103% of the Long-Term Average (LTA). Rainfall totals ranged from 42mm to 81mm (71% to 147 % of the LTA) with the highest totals in the south of the area and the lowest in the north. The 3-month, 6-month and 12-month totals indicate that the southern areas have received more rainfall than those in the north.

Soil moisture deficits (SMD) generally decreased in the second half of the month when the majority of the month's rainfall occurred. By the end of November, the area had an SMD of 13mm, which remains within the below normal category for this time of year.

River flows in most sites responded in line with the rainfall received across November. Monthly mean river flows ranged from 55% to 348% of the LTA, falling within the normal to notably high classifications. Following the normal levels of rainfall and below normal SMD across the area in November, groundwater levels remained normal or higher at all sites with data. With the exception of Covenham, reservoirs in the area ended the month above their normal operating curves.

1.1 Rainfall

November overall brought normal levels of rainfall, with an average total of 58mm– 103% of the LTA for Lincolnshire and Northamptonshire. This marks the second consecutive month with normal rainfall levels. However, most rain fell in the latter half of the month, with almost 76% (44mm) recorded over five days: 18, 22, 23, 24 and 26 November. On 24 November 2024, a deep Atlantic low-pressure system named Storm Bert brought significant rainfall, with 28mm recorded in Upper Welland and Nene catchment and an average of 12mm rainfall across the six catchments, making it the wettest day in November 2024. Rainfall totals varies across the region with the lowest rainfall was in the Louth Grimsby and Ancholme at 42mm (71% of the LTA) and the highest rainfall was in the Upper Welland and Nene with 81mm (147% of the LTA). As a result, the catchments experienced rainfall ranging from below normal to above normal rainfall for the time of year.

A north-south trend in rainfall distribution is evident, with southern areas receiving more ranfall than the north. This pattern is reflected in the longer-term rainfall maps, which unanimously display the higher totals received in the south compared to the north.

1.2 Soil moisture deficit and recharge

SMD responded in line with the rainfall patterns observed through November. SMD increased slightly across all six catchments during the dry first half of the month but saw a decrease again in the second half of the month when the month's main rainfall fell. The lowest levels of SMD were recorded in the Upper Welland and Nene hydrological area (4mm), whilst the highest levels were observed in the Ancholme Grimsby Louth (21mm), as well as the South Forty Foot and Hobhole hydrological area (21mm). On average, SMD for the region decreased from 28mm at the end of October to 13mm by the end of November. Despite this reduction, the figure remains within the below normal range for the time of year. The SMD difference-to-LTA (mm) map show most hydrological areas are in the -50 to -26 category, indicating that they are all significantly wetter than normal for the time of year. The only exception is the Ancholme Grimsby Louth hydrological area that is in the -25 to -6 category, meaning it is only slightly wetter than normal.

1.3 River flows

Monthly mean river flows ranged from 55% to 348% of the LTA, spanning classifications from normal to notably high. At most sites, river flow responded proportionally to the rainfall received in November. Higher flow classifications were observed in the southern areas, while normal flow classifications in the north. Most sites have experienced a reduction in classification since October 2024. 2 of the twelve sites (Glen and Geldharts Mill (Nene)) have not changed banding since October 2024. The mean monthly flow at Lud in the Steeping Great Eau and Long Eau hydrological area remained normal, showing no change in banding since August 2024.

1.4 Groundwater levels

Following the normal levels of rainfall and below normal SMD across the area in November, groundwater levels remained at normal or higher classifications at all monitored sites. All groundwater bandings decreased since October 2024, except Grainsby which remained normal for the time of year. This trend is likely due to the drier start to the month, with the majority of rainfall occurring in the second half of the month. The full impact of this rainfall is expected to become evident in early December.

1.5 Reservoir stocks

With the exception of Covenham, reservoirs in the area ended the month above their normal operating curves. The level at Covenham was 13% below target in November, however levels are not alarmingly low.

1.6 Environmental impact

During November, there were eleven flood alerts, twenty-eight flood warnings and 2 severe flood warnings issued in Lincolnshire and Northamptonshire. All transfer scheme remained off throughout November. There were 2 HOFs (Hands Off Flow) active in the Steeping River Catchment in November.

1.7 Forward look

1.7.1 Probabilistic ensemble projections for river flows at key sites

December 2024: All sites are showing a greatly increased probability of greater than normal flows.

March 2025: The two Nene sites are showing slightly increased probabilities of above normal flows. North Brook is showing a slightly increased probability of below normal flows.

1.7.2 Probabilistic ensemble projections for groundwater levels in key aquifers

March 2025: All sites are showing an increased probability of groundwater levels being normal or higher with none of the modelled rainfall scenarios showing exceptionally low levels.

September 2025: All sites are showing a reduced probability of exceptionally low levels.

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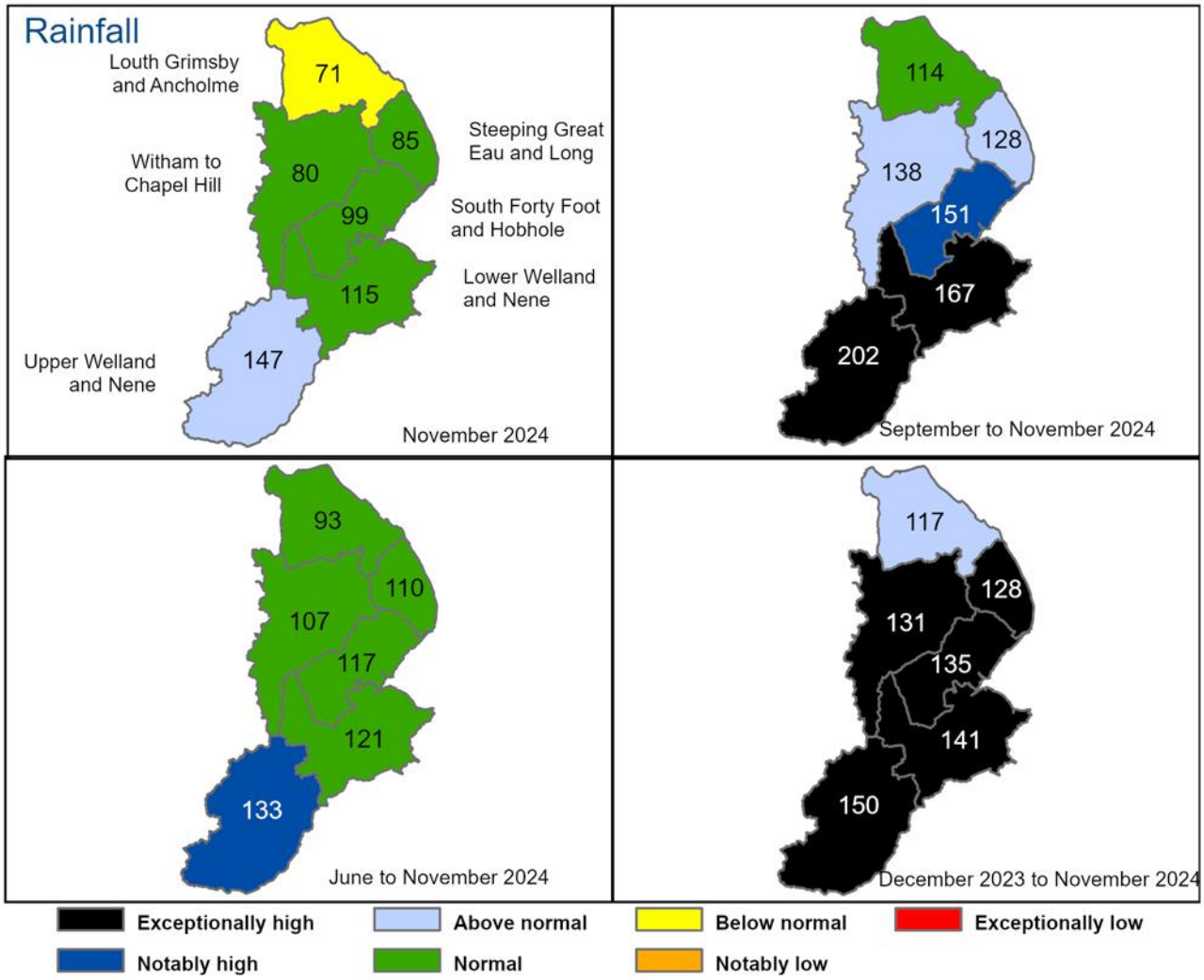
2 Rainfall

2.1 Rainfall map

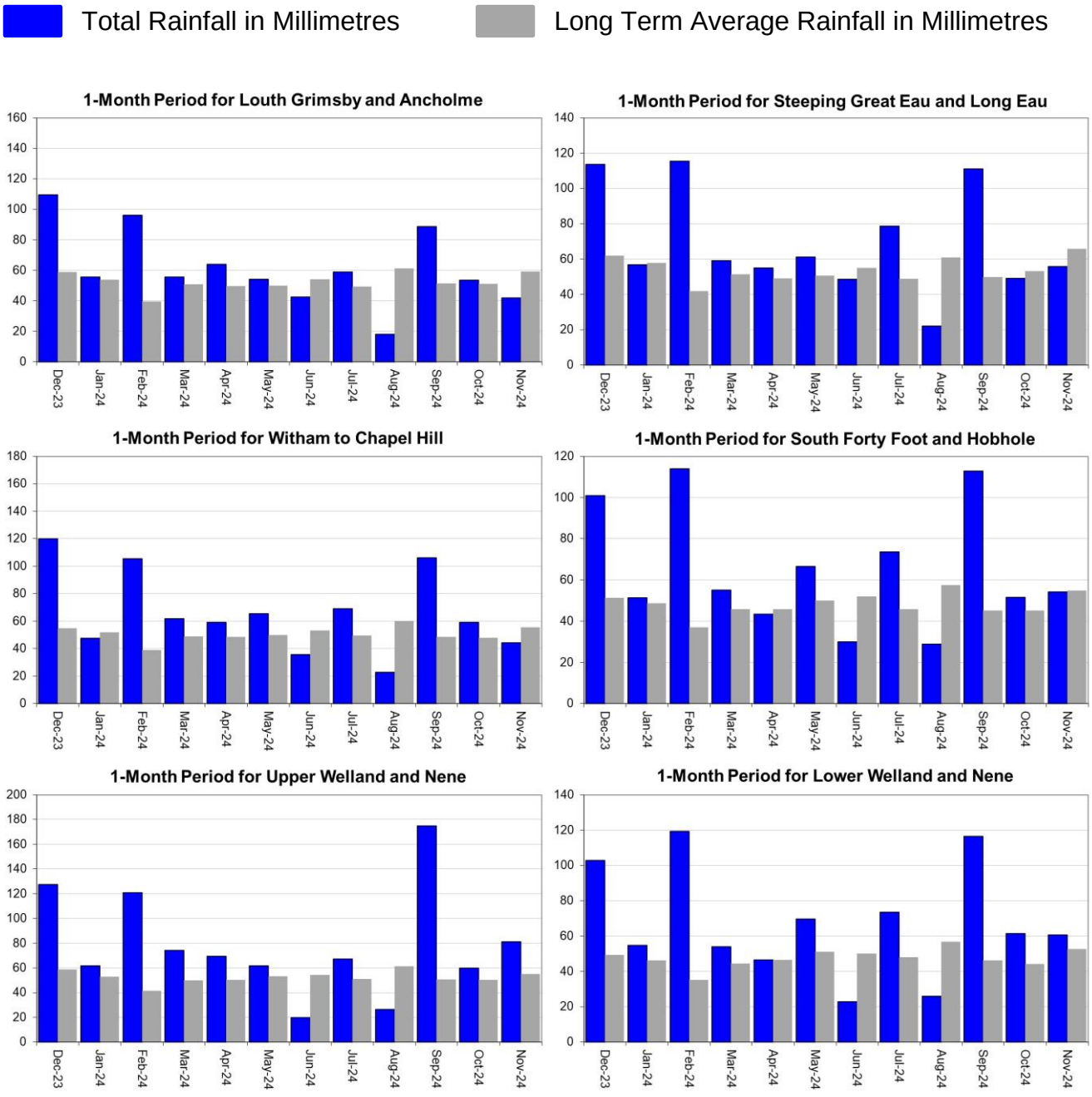
Figure 2.1: Total rainfall for hydrological areas across Lincolnshire and Northamptonshire, expressed as a percentage of long term average rainfall for the current month (up to 30 November 2024), the last 3 months, the last 6 months, and the last 12 months. Category classes are based on an analysis of 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.

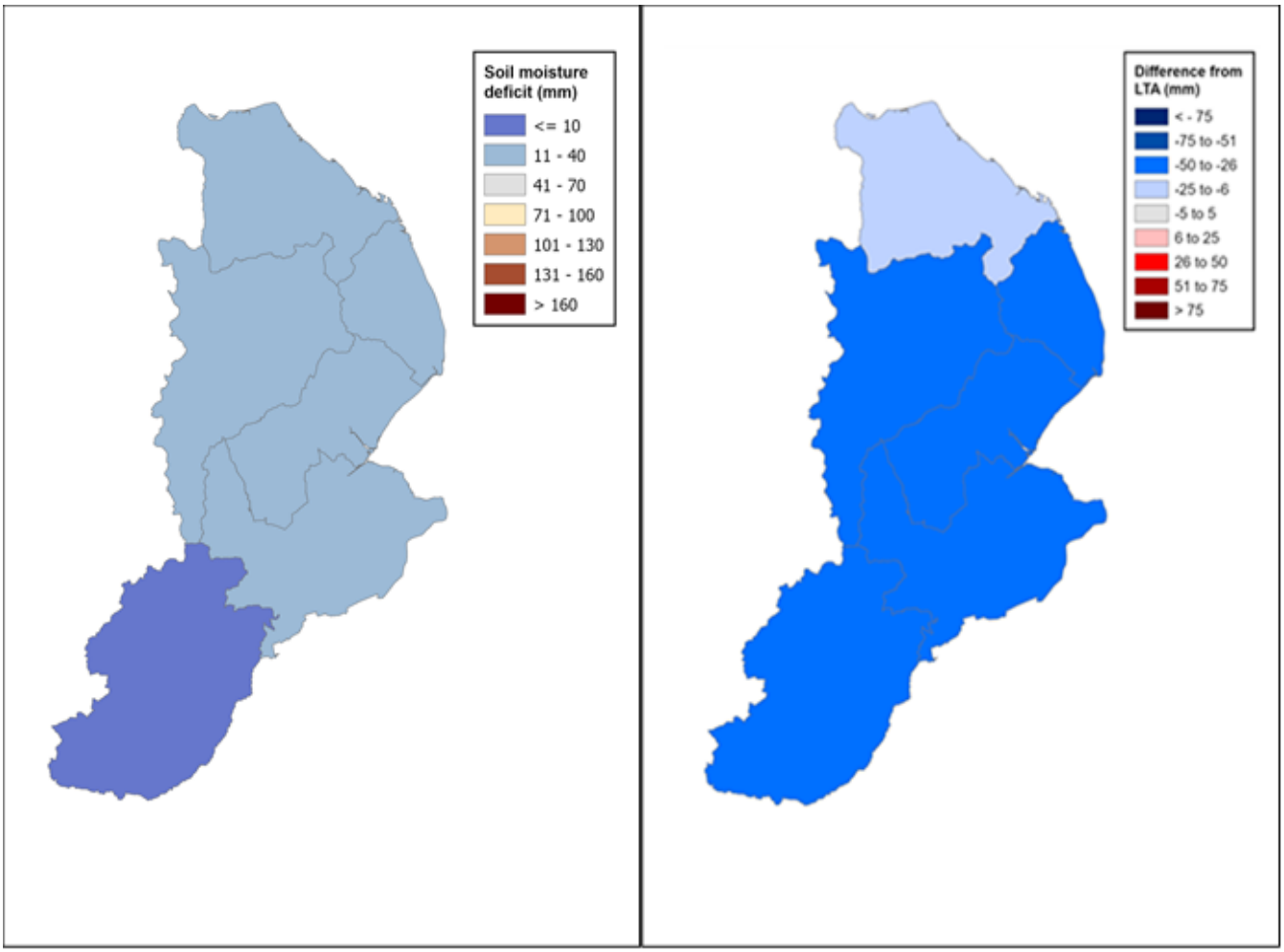


HadUK rainfall data. (Source: Met Office. Crown copyright, 2024).

3 Soil moisture deficit

3.1 Soil moisture deficit map

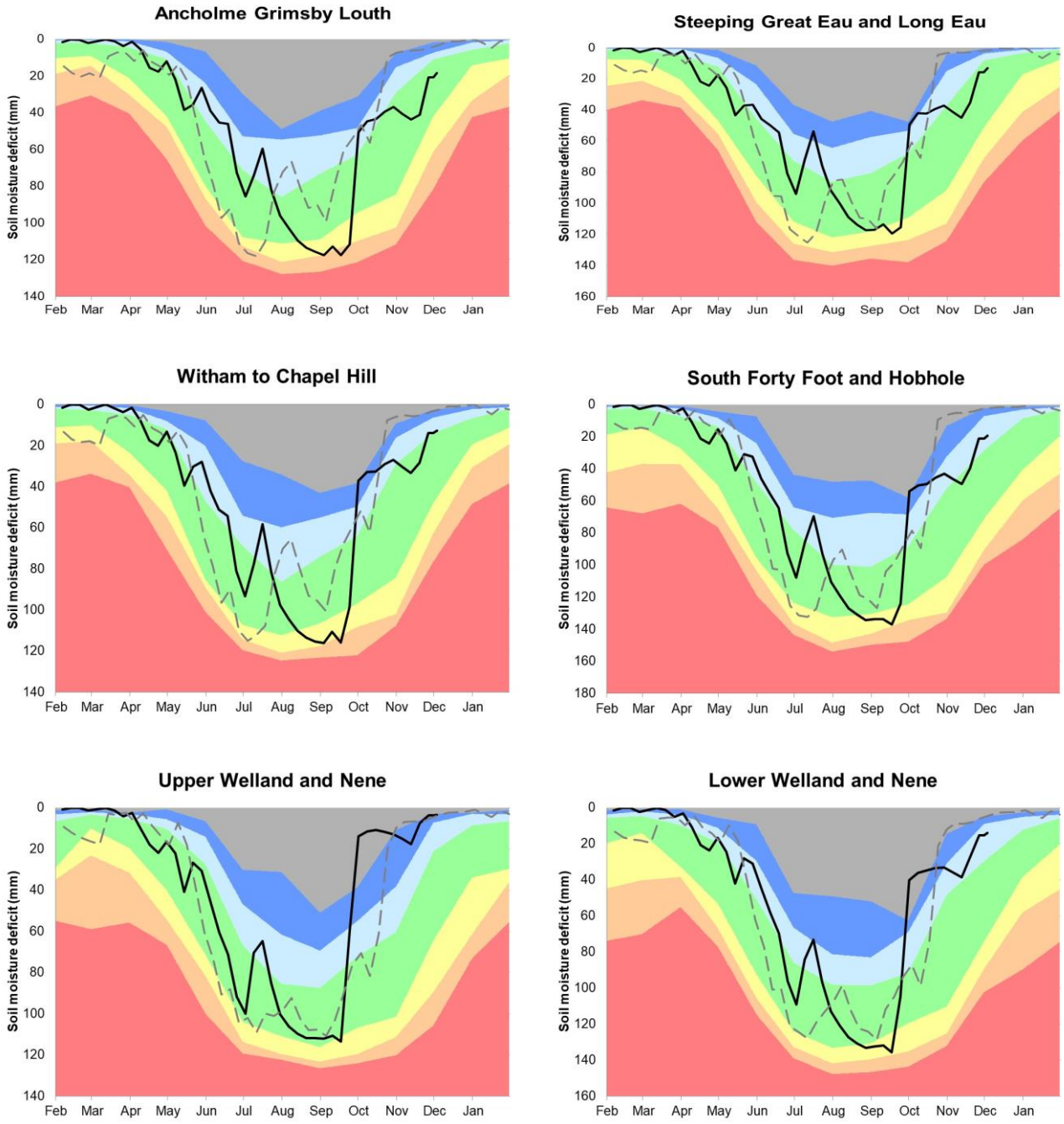
Figure 3.1:Left map shows Soil moisture deficits for weeks ending 30 November 2024. Right map shows the difference (mm) of the actual soil moisture deficit from the 1961 to 1990 long term average soil moisture deficits. MORECS data for real land use.



(Source: Met Office. Crown copyright, 2024). All rights reserved. Environment Agency, 100024198, 2024.

3.2 Soil moisture deficit charts

Figure 3.2: Latest soil moisture deficit compared to previous year, maximum, minimum, and 1961 to 1990 long term average. Weekly MORECS data for real land use.

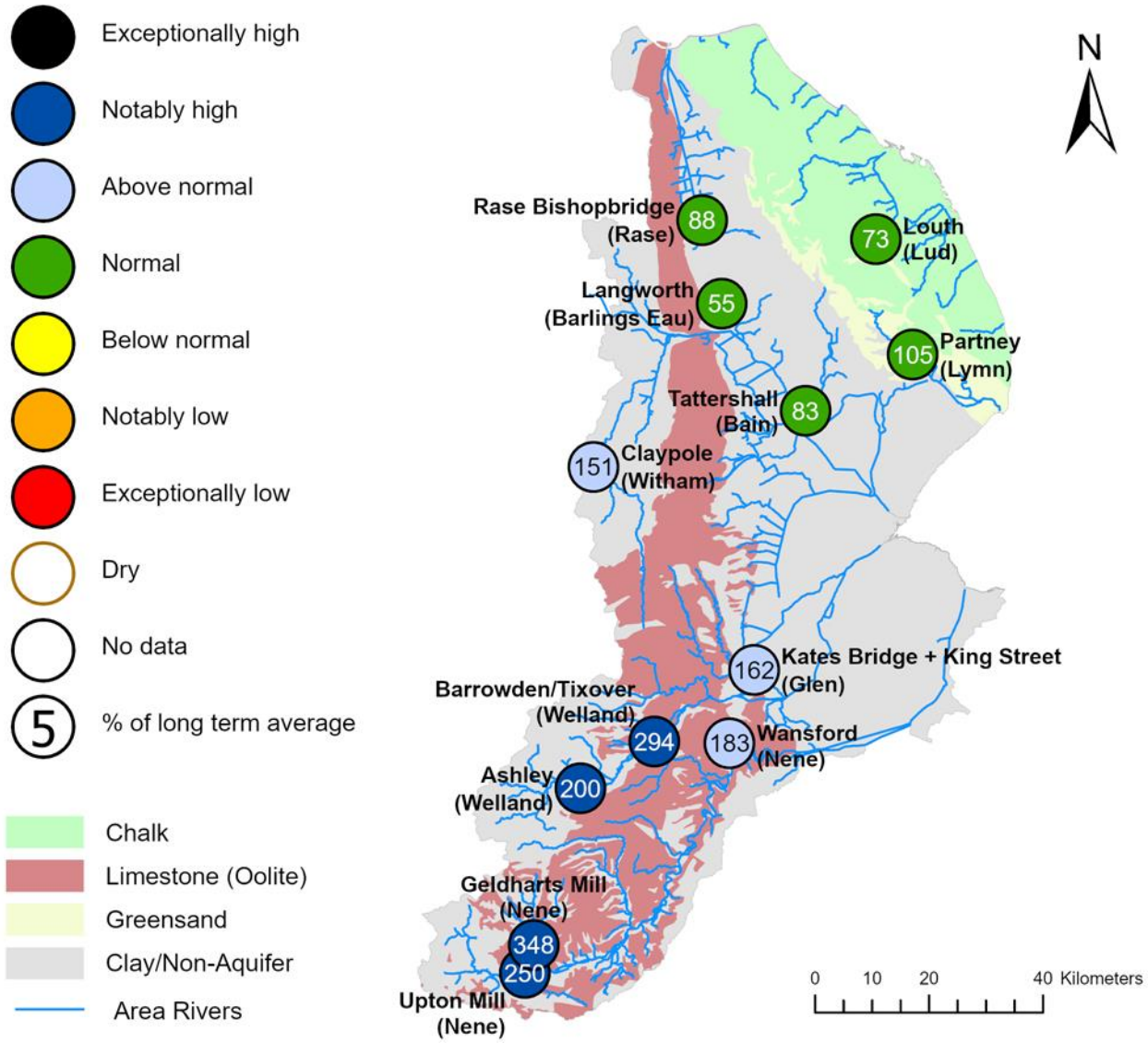


(Source: Met Office. Crown copyright, 2024). All rights reserved. Environment Agency, 100024198, 2024

4 River flows

4.1 River flows map

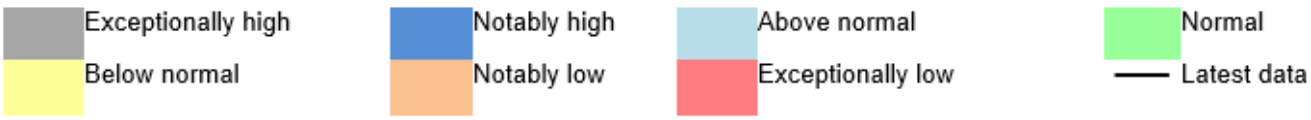
Figure 4.1: Monthly mean river flow for indicator sites for November 2024, expressed as a percentage of the respective long term average and classed relative to an analysis of historic November monthly means Table available in the appendices with detailed information.

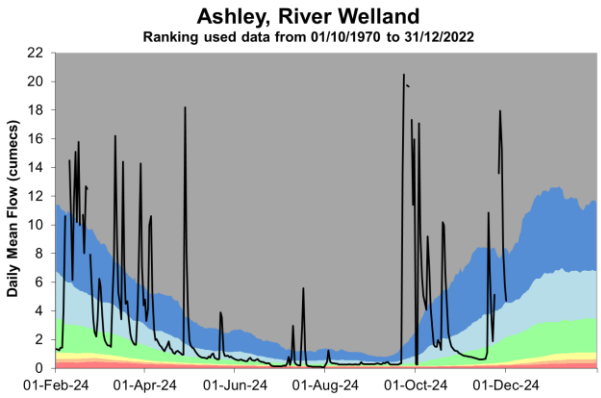


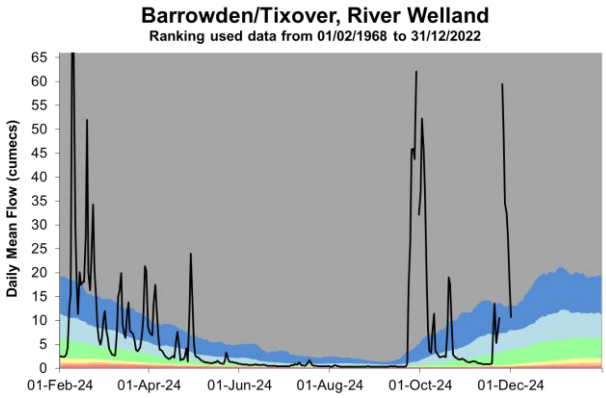
(Source: Environment Agency). Crown copyright. All rights reserved. Environment Agency, 100024198, 2024.

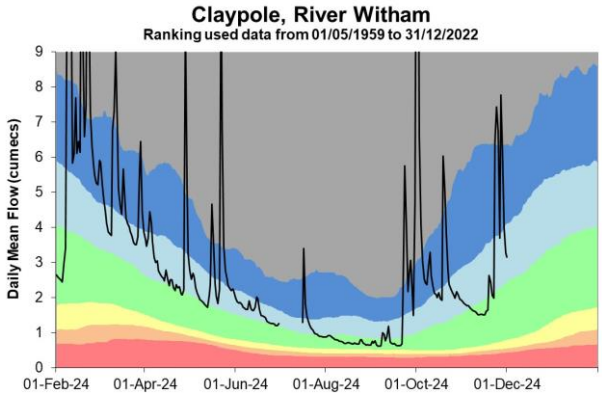
4.2 River flow charts

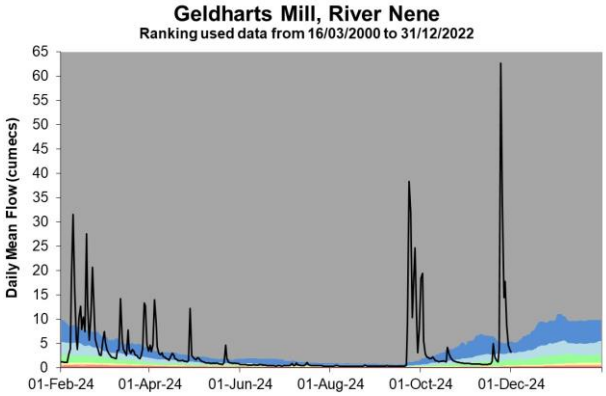
Figure 4.2: Daily mean river flow for index sites over the past year, compared to an analysis of historic daily mean flows, and long term maximum and minimum flows.

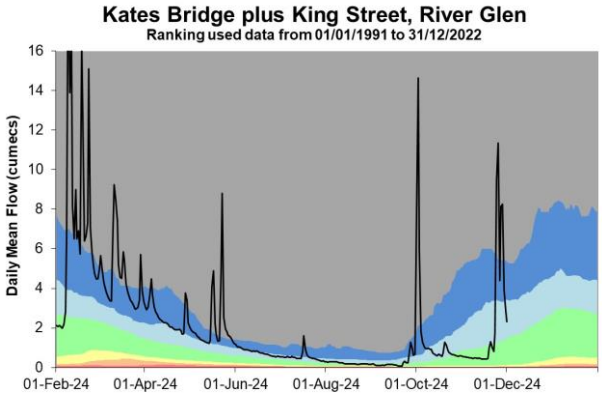


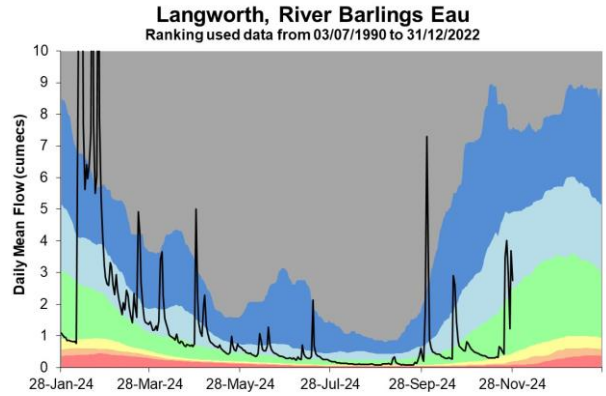


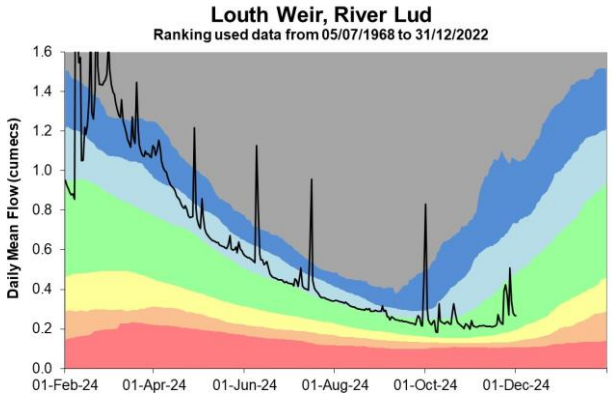


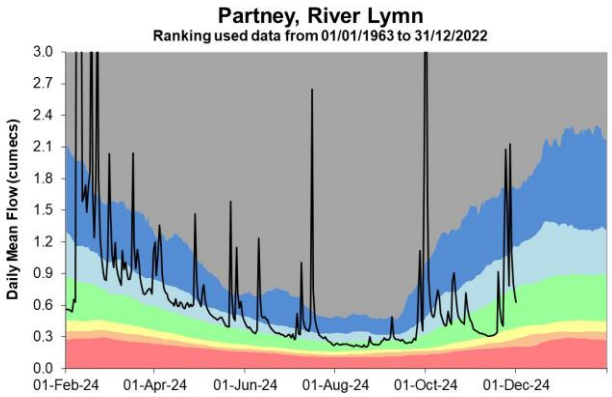


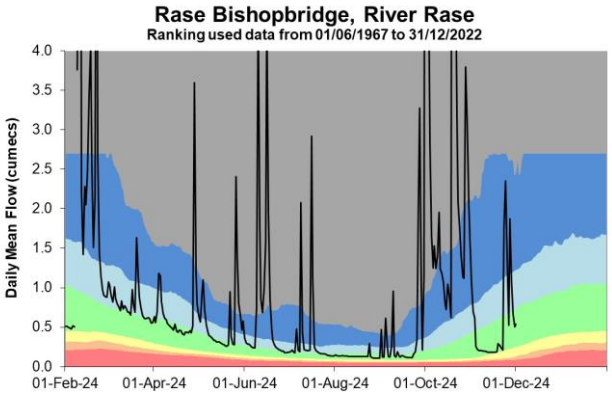


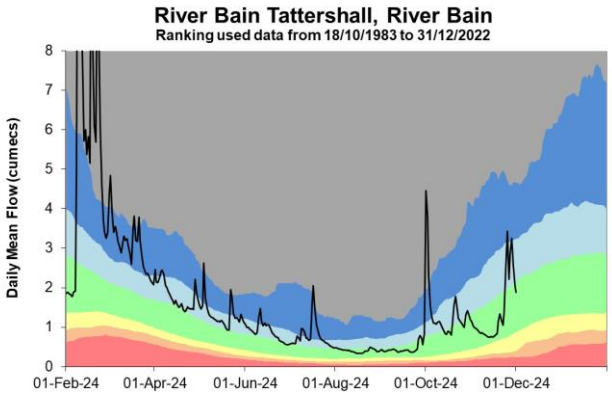


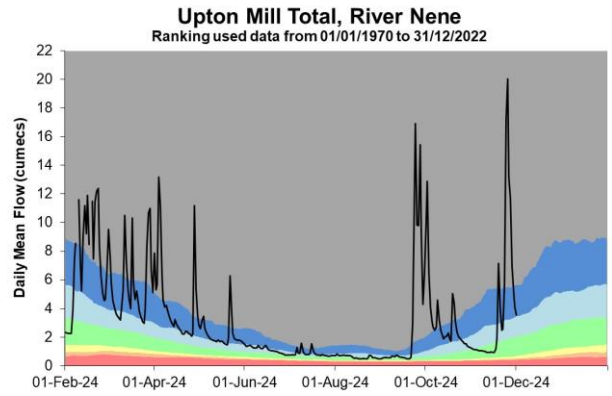


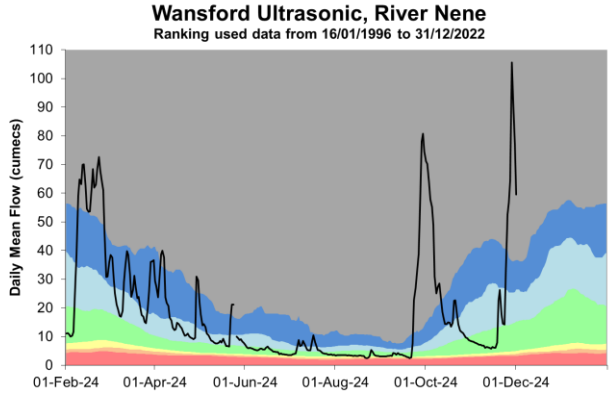










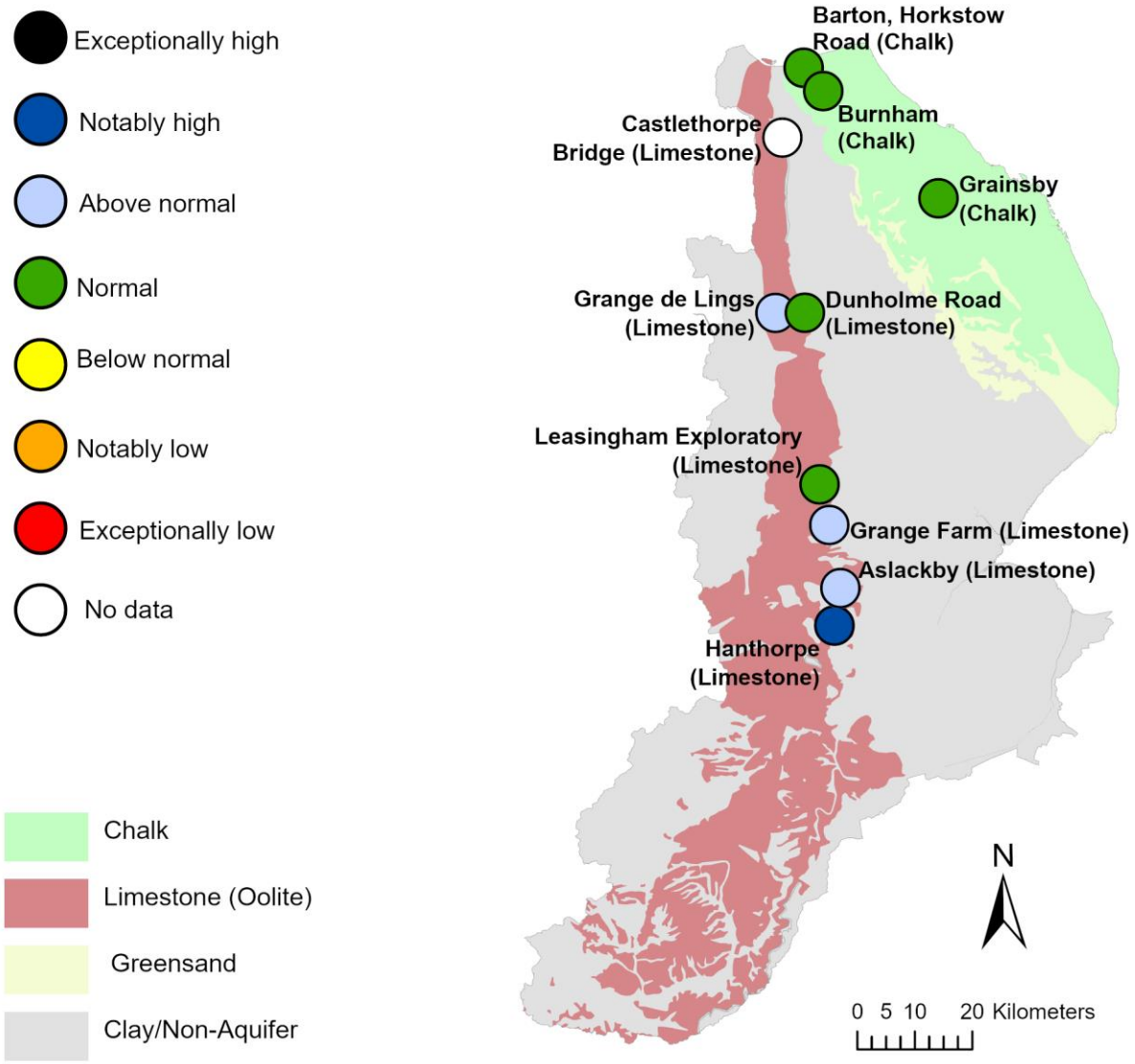


Source: Environment Agency.

5 Groundwater levels

5.1 Groundwater levels map

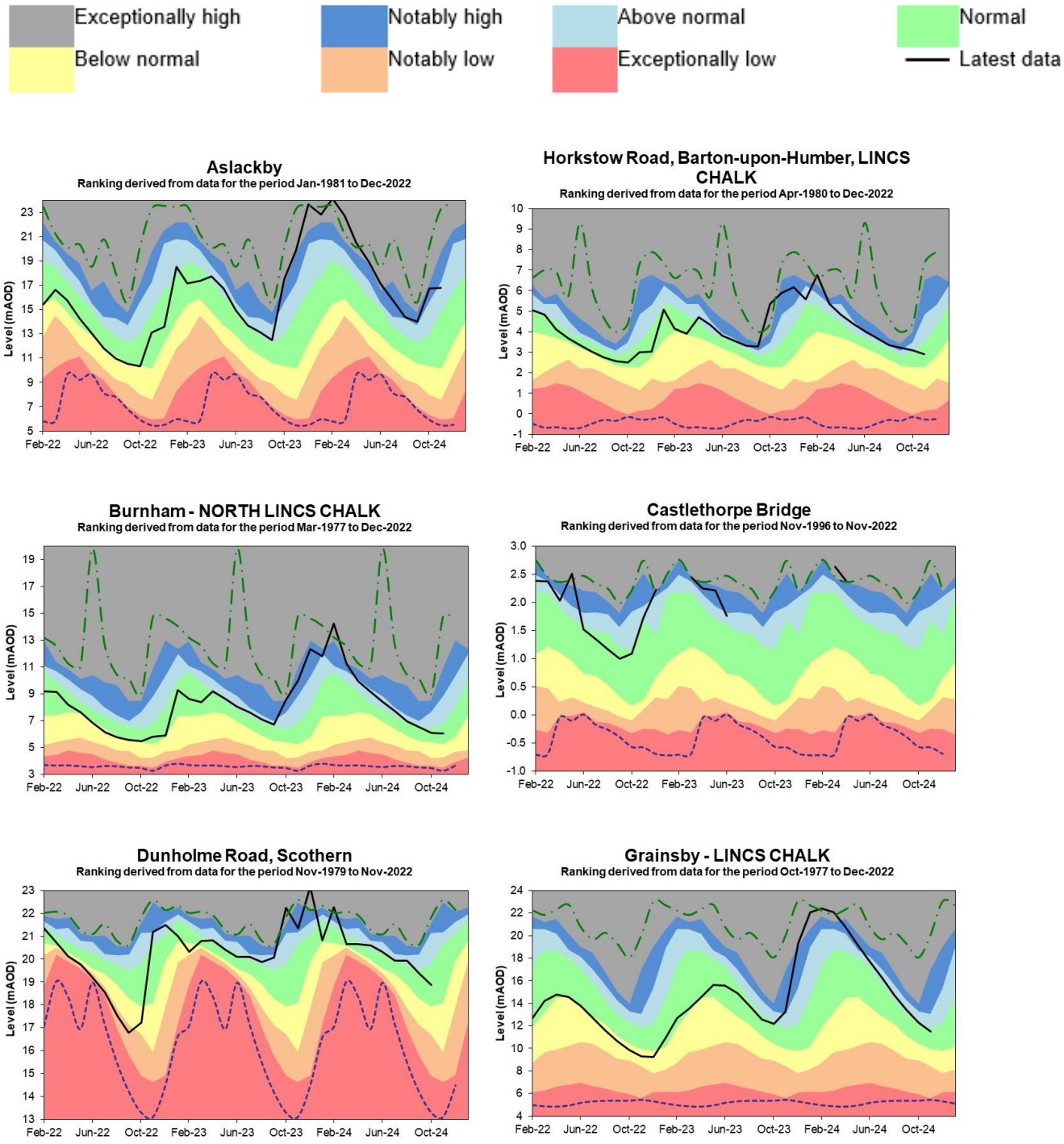
Figure 5.1: Groundwater levels for indicator sites at the end of November 2024, classed relative to an analysis of respective historic November levels. Table available in the appendices with detailed information.

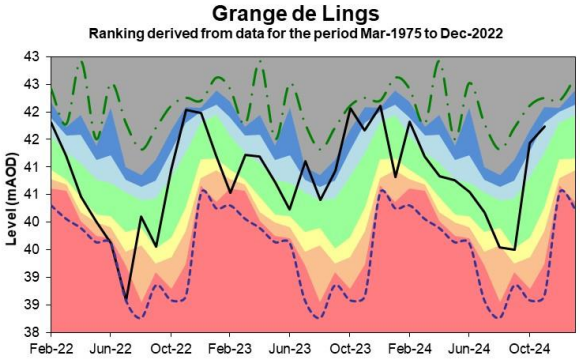


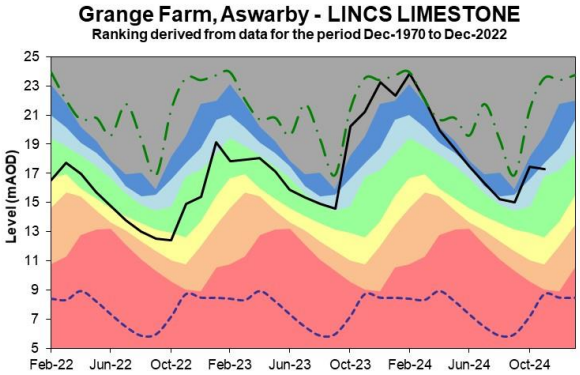
(Source: Environment Agency). Geological map reproduced with kind permission from UK Groundwater Forum, BGS copyright NERC. Crown copyright. All rights reserved. Environment Agency, 100024198, 2024.

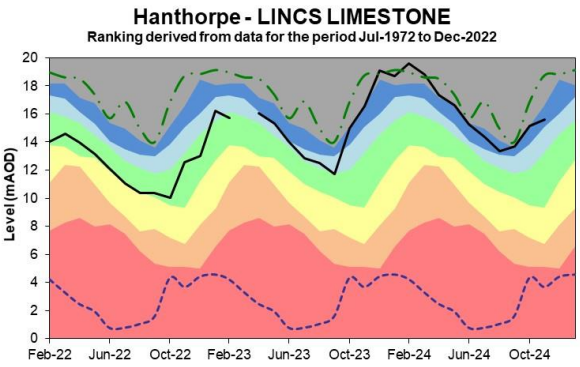
5.2 Groundwater level charts

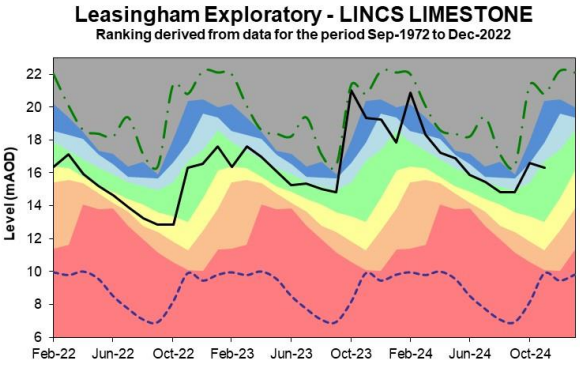
Figure 5.2: End of month groundwater levels at index groundwater level sites for major aquifers. 22 months compared to an analysis of historic end of month levels and long term maximum and minimum levels.







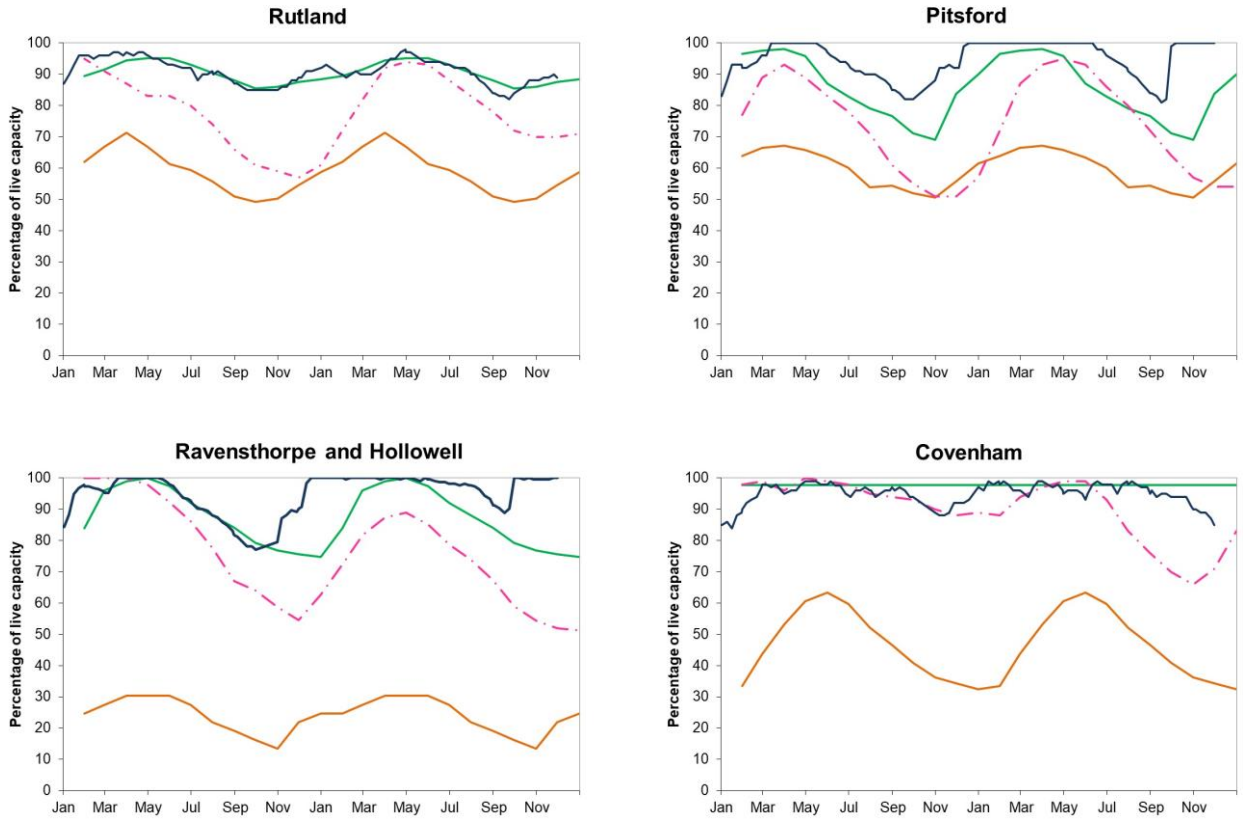




Source: Environment Agency, 2024.

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

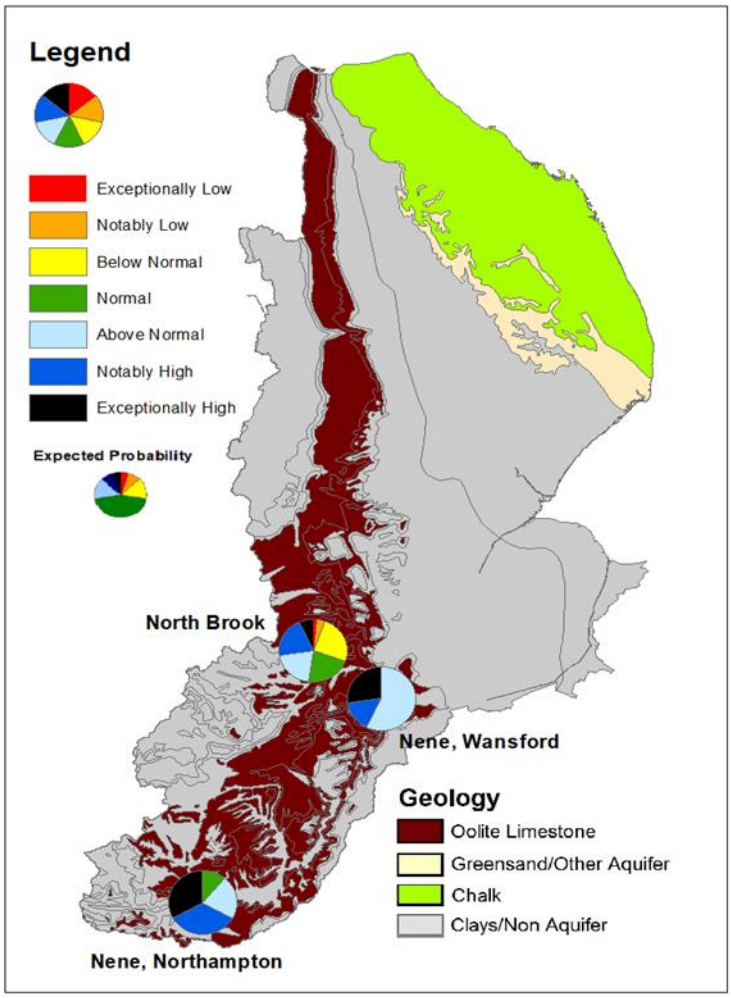
2023-2024 Normal Operating Curve Drought Alert Curve 1995-1996

(Source: water companies).

7 Forward Look

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

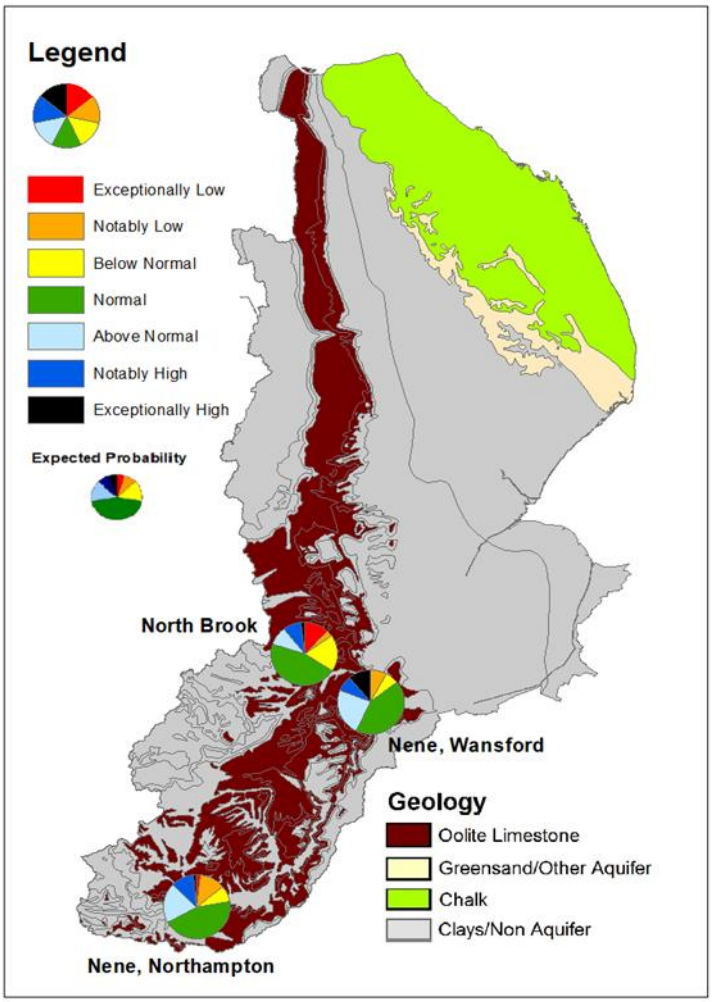
Table available in the appendices with detailed information. Exceptionally high or low levels are those which would typically occur 5% of the time within the historic record. Notably high or low levels are those which would typically occur 8% of the time. Above normal or below normal levels are those which would typically occur 15% of the time. Normal levels are those which would typicall occur 44% of the time 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 March 2025

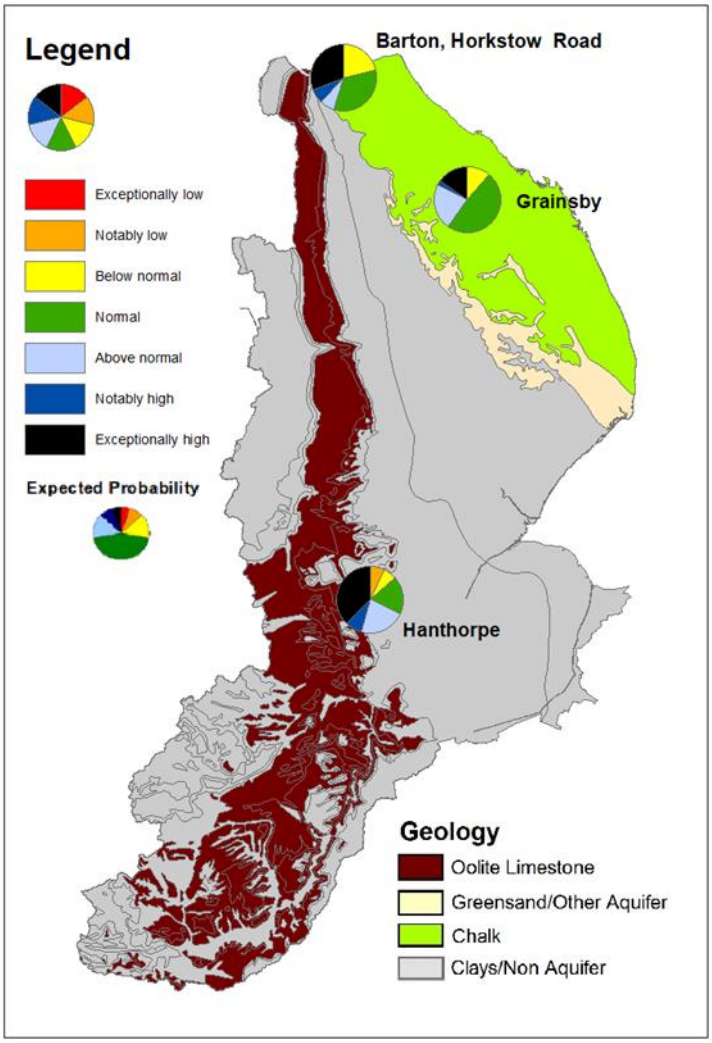
Table available in the appendices with detailed information. Exceptionally high or low levels are those which would typically occur 5% of the time within the historic record. Notably high or low levels are those which would typically occur 8% of the time. Above normal or below normal levels are those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

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

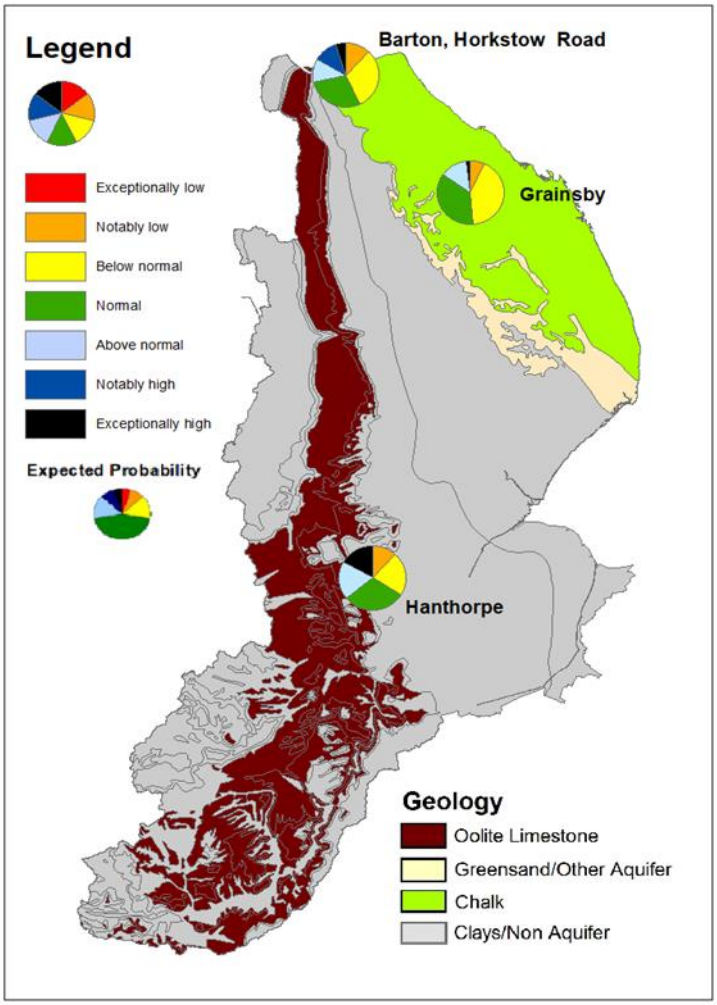
Table available in the appendices with detailed information. Exceptionally high or low levels are those which would typically occur 5% of the time within the historic record. Notably high or low levels are those which would typically occur 8% of the time. Above normal or below normal levels are those 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) 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 September 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) Geological map reproduced with kind permission from UK Groundwater Forum, BGS © NERC. Crown copyright. All rights reserved. Environment Agency, 100026380, 2024

8 Glossary

8.1 Terminology

Aquifer

A geological formation able to store and transmit water.

Areal average rainfall

The estimated average depth of rainfall over a defined area. Expressed in depth of water (mm).

Artesian

The condition where the groundwater level is above ground surface but is prevented from rising to this level by an overlying continuous low permeability layer, such as clay.

Artesian borehole

Borehole where the level of groundwater is above the top of the borehole and groundwater flows out of the borehole when unsealed.

Cumecs

Cubic metres per second (m^{3s-1}).

Effective rainfall

The rainfall available to percolate into the soil or produce river flow. Expressed in depth of water (mm).

Flood alert and flood warning

Three levels of warnings may be issued by the Environment Agency. Flood alerts indicate flooding is possible. Flood warnings indicate flooding is expected. Severe flood warnings indicate severe flooding.

Groundwater

The water found in an aquifer.

Long term average (LTA)

The arithmetic mean calculated from the historic record, usually based on the period 1961 to 1990. However, the period used may vary by parameter being reported on (see figure captions for details).

mAOD

Metres above ordnance datum (mean sea level at Newlyn Cornwall).

MORECS

Met Office Rainfall and Evaporation Calculation System. Met Office service providing real time calculation of evapotranspiration, soil moisture deficit and effective rainfall on a 40 by 40 km grid.

Naturalised flow

River flow with the impacts of artificial influences removed. Artificial influences may include abstractions, discharges, transfers, augmentation and impoundments.

NCIC

National Climate Information Centre. NCIC area monthly rainfall totals are derived using the Met Office 5 km gridded dataset, which uses rain gauge observations.

Recharge

The process of increasing the water stored in the saturated zone of an aquifer. Expressed in depth of water (mm).

Reservoir gross capacity

The total capacity of a reservoir.

Reservoir live capacity

The capacity of the reservoir that is normally usable for storage to meet established reservoir operating requirements. This excludes any capacity not available for use (for example, storage held back for emergency services, operating agreements or physical restrictions). May also be referred to as ‘net’ or ‘deployable’ capacity.

Soil moisture deficit (SMD)

The difference between the amount of water actually in the soil and the amount of water the soil can hold. Expressed in depth of water (mm).

8.2 Categories

Exceptionally high

Value likely to fall within this band 5% of the time.

Notably high

Value likely to fall within this band 8% of the time.

Above normal

Value likely to fall within this band 15% of the time.

Normal

Value likely to fall within this band 44% of the time.

Below normal

Value likely to fall within this band 15% of the time.

Notably low

Value likely to fall within this band 8% of the time.

Exceptionally low

Value likely to fall within this band 5% of the time.

9 Appendices

9.1 Rainfall table

Hydrological area	Nov 2024 rainfall % of long term average 1961 to 1990	Nov 2024 band	Sep 2024 to November cumulative band	Jun 2024 to November cumulative band	Dec 2023 to November cumulative band
Louth Grimsby And Ancholme	71	Below Normal	Normal	Normal	Above normal
Lower Welland And Nene	115	Normal	Exceptionally high	Normal	Exceptionally high
South Forty Foot And Hobhole	99	Normal	Notably high	Normal	Exceptionally high
Steeping Great Eau And Long Eau	85	Normal	Above normal	Normal	Exceptionally high
Upper Welland And Nene	147	Above Normal	Exceptionally high	Notably high	Exceptionally high
Witham To Chapel Hill	80	Normal	Above normal	Normal	Exceptionally high

9.2 River flows table

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

Upton Mill Total	Nene (kislingbury Branch)	Nene Kislingbry Bridge	Notably high	Exceptionally high
Wansford Combined	Nene (wollaston To Wansford)	Nene Wansford	Above normal	Exceptionally high

9.3 Groundwater table

Site name	Aquifer	End of Nov 2024 band	End of Oct 2024 band
Aslackby	Limestone (cornbrash Formation)	Above normal	Notably high
Barton-upon-humber	Grimsby Ancholme Louth Chalk	Normal	Above normal
Burnham	Grimsby Ancholme Louth Chalk	Normal	Normal
Castlethorpe Bridge	Grimsby Ancholme Louth Limestone		
Dunholme Road, Scothern	Grimsby Ancholme Louth Limestone	Normal	Normal
Grainsby	Grimsby Ancholme Louth Chalk	Normal	Normal
Grange De Lings	Grimsby Ancholme Louth Limestone	Above normal	Notably high
Grange Farm, Aswarby	Limestone (mudstone - Peterborough Member)	Above normal	Notably high

Hanthorpe	Limestone (cornbrash Formation)	Notably high	Exceptionally high
Leasingham Exploratory	Limestone (rutland Formation)	Normal	Above normal

9.4 Ensemble projections tables

9.4.1 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	0.0	1.4
Notably low	0.0	0.0	4.1
Below normal	0.0	0.0	24.7
Normal	11.1	0.0	21.9
Above normal	22.2	57.1	20.5
Notably high	33.3	15.9	20.5
Exceptionally high	33.3	27.0	6.8

9.4.2 Probabilistic ensemble projection of river flows at key sites in March 2025

Percentage of pie chart for each band

Site	Nene Nton	Nene Wansford	North Brook
Exceptionally low	1.6	0.0	12.3
Notably low	12.7	7.9	3.1
Below normal	7.9	6.3	18.5
Normal	44.4	42.9	46.2
Above normal	20.6	23.8	9.2
Notably high	11.1	7.9	9.2
Exceptionally high	1.6	11.1	1.5

9.4.3 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	0.0	0.0
Notably low	0.0	6.8	0.0
Below normal	11.1	6.8	21.4
Normal	48.9	18.6	33.3
Above normal	22.2	22.0	7.1
Notably high	2.2	8.5	7.1
Exceptionally high	15.6	37.3	31.0

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

Percentage of pie chart for each band

Site	Grainsby	Hanthorpe	Horkstow
Exceptionally low	0.0	0.0	0.0
Notably low	6.7	11.9	11.9
Below normal	42.2	22.0	31.0
Normal	35.6	30.5	28.6
Above normal	13.3	18.6	11.9
Notably high	0.0	0.0	11.9
Exceptionally high	2.2	16.9	4.8