Monthly water situation report: Lincolnshire and Northamptonshire Area

1 Summary - December 2024

In December, the Lincolnshire and Northamptonshire area received an average total rainfall of 67mm, which was 120% of the long-term average (LTA). On average, rainfall totals for the area as a whole were classified as normal for the time of year. This marks the third consecutive month with normal rainfall levels. Soil moisture deficits (SMD) decreased in all hydrological areas except the Lower Welland and Nene, where levels slightly increased toward the end of the month. By the end of December, the area had an SMD of 4mm, which remains within the below normal category for this time of year. River flows at most sites responded in line with the rainfall received across December. Monthly mean river flows ranged from 137% to 259% of the LTA, falling within the above normal to notably high classifications. Following the normal levels of rainfall and below normal SMD across the area in December, groundwater levels remained normal or higher at all sites with available data. With the exception of Covenham, reservoirs in the area ended the month above their normal operating curves.

1.1 Rainfall

In December, the Lincolnshire and Northamptonshire area received an averaged total rainfall of 67mm, which was 120% of the LTA. Rainfall was distributed throughout the month, but six days (4, 5, 7, 8, 18 and 31 December), accounted for approximately 87% of the month's total rainfall. 18 December was the wettest day of the month, with an average of 18mm rainfall across the six catchments.

On 7 December 2024, a deep Atlantic low-pressure system named Storm Darragh brought significant rainfall. Totals included 22mm recorded in Steeping Great Eau and Long Eau, 18mm in Louth Grimsby and Ancholme, and an average of 14mm rainfall across the six catchments, making it the 2nd wettest day in December 2024. A south-north trend in rainfall distribution was evident, with northern areas receiving slightly higher rainfall than the south.

On average, rainfall totals received for the area as a whole was classified as normal for the time of year. This marks the third consecutive month with normal rainfall levels. Rainfall across the hydrological areas ranged from 58mm to 79mm (102% - 135% of the LTA), resulting in classifications of normal to above normal rainfall for the time of year. Although the 3-month map displays all six hydrological areas classified as normal, a north-south trend pattern is reflected in all the long-term rainfall maps, which unanimously shows the higher totals received in the south compared to the north.

1.2 Soil moisture deficit and recharge

SMD decreased in all hydrological areas except the Lower Welland and Nene where the levels slightly increased towards the end of the month. The lowest levels of SMD were observed in the Upper Welland and Nene (2.7mm), whilst the highest levels were observed in the Ancholme Grimsby Louth (6.3mm). On average, SMD for the area decreased from 13mm at the end of November to 4mm by the end of December. Despite this reduction, the overall 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 -25mm to -6mm category, indicating that they are slightly wetter than normal for the time of year. The only exception is the Lower Welland and Nene hydrological area that is in the -50mm to -26mm category, meaning it is significantly wetter than normal.

1.3 River flows

Mean monthly flows ranged from 137% to 259% of the LTA, and from above normal to notably high classification. At most sites, river flow responded in line with the amount of rainfall received in December. River flow sites in the north of the area changed banding from normal levels in November to above normal and notably high classification in December. Flow sites in the south of the area did not change banding since November 2024, except Geldharts Mill (Nene) which changed banding from notably high to above normal classification.

1.4 Groundwater levels

Following the normal levels of rainfall and below normal SMD across the area in December, groundwater levels remained normal or higher at all sites with data. Except Grange de Lings, the groundwater level trends showed a slight increase at all monitoring sites with data. Grange de lings decreased from above normal to normal level classification.

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 15% below target in November, however levels are not alarmingly low.

1.6 Environmental impact

During December, there were 18 flood alerts, and 4 flood warnings issued. All transfer schemes remained off throughout December. No licence cessations were issued.

1.7 Forward look

1.7.1 Probabilistic ensemble projections for river flows at key sites

March 2025: All sites are showing a slightly increased probabilities of greater than normal flows with none of the modelled rainfall scenarios showing exceptionally low level.

June 2025: The two Nene sites are showing increased probabilities of normal flows. North Brook is showing a reduced probability of extreme flows (both high and low).

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.

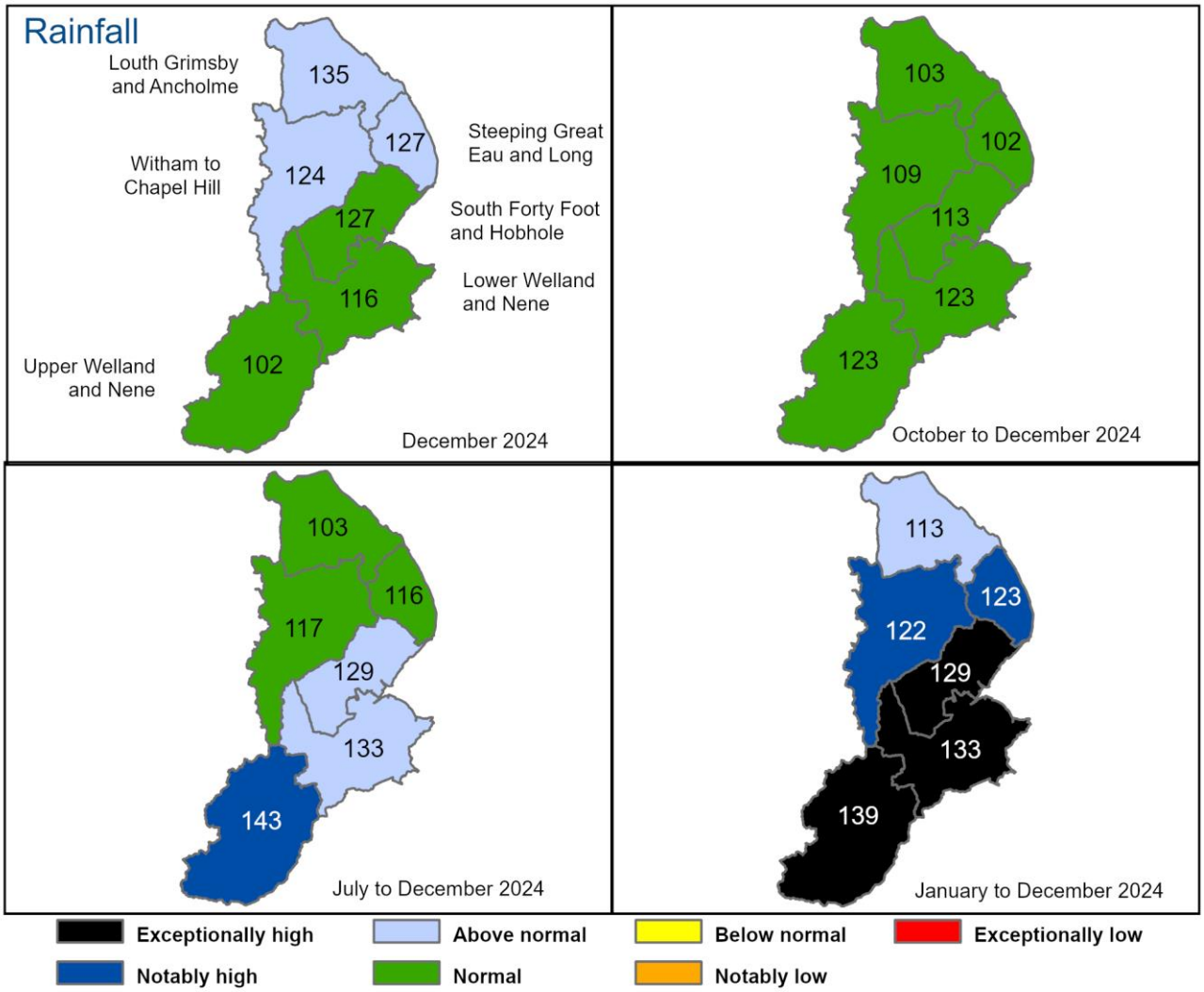
Author: Pan Hydrology Team, Hydrology-EAN-and-LNA@environment-agency.gov.uk

Contact Details: 03708 506 506

2 Rainfall

2.1 Rainfall map

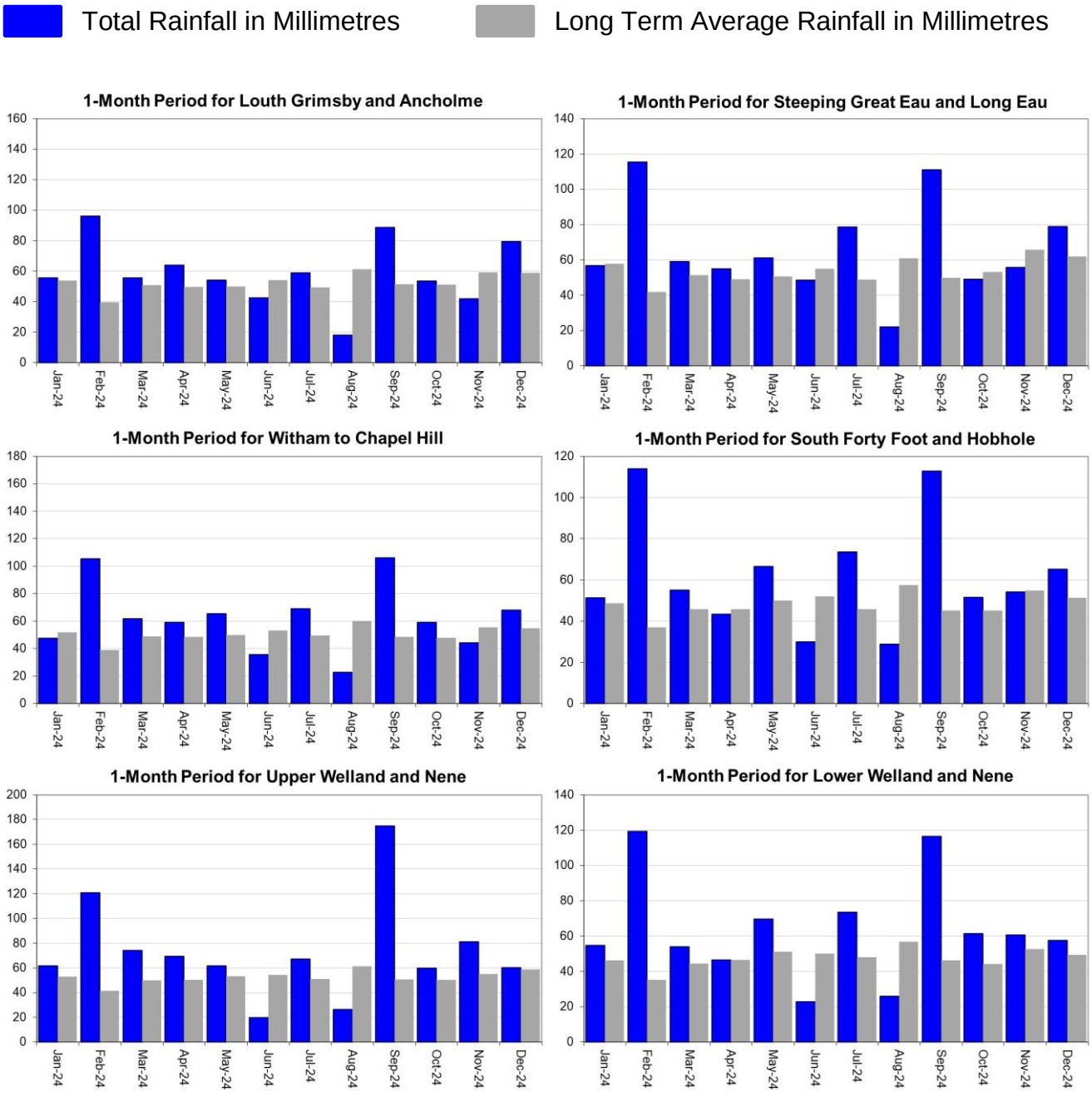
Figure 2.1: Total rainfall for hydrological areas across Lincolnshire and Northamptonshire, expressed as a percentage of long term average rainfall for the current month (up to 31 December 2024), the last 3 months, the last 6 months, and the last 12 months. Category classes are based on an analysis of 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, 2025). 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, 2025.

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.

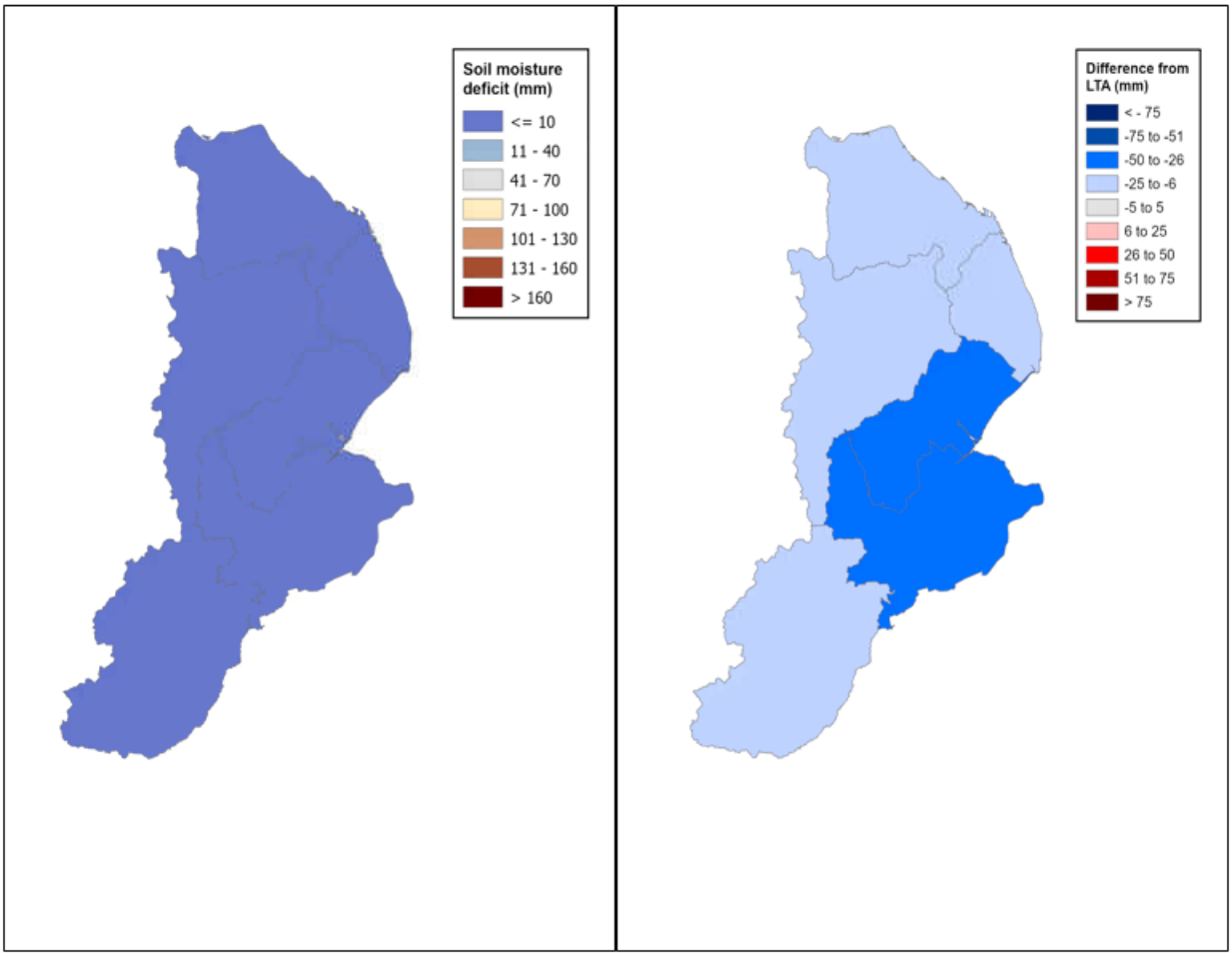


HadUK rainfall data. (Source: Met Office. Crown copyright, 2025).

3 Soil moisture deficit

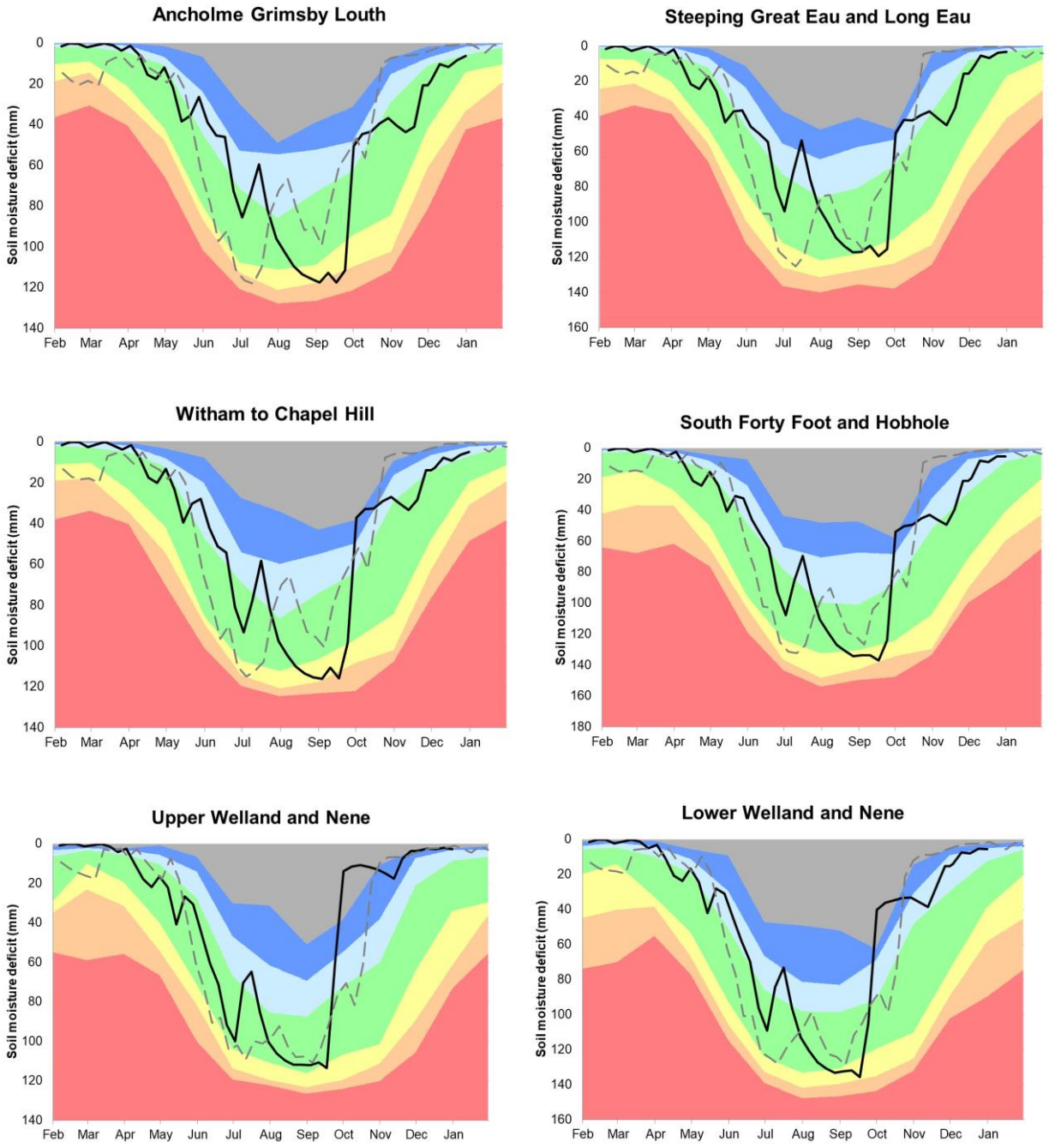
3.1 Soil moisture deficit map

Figure 3.1:Left map shows Soil moisture deficits for weeks ending 31 December 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.



3.2 Soil moisture deficit charts

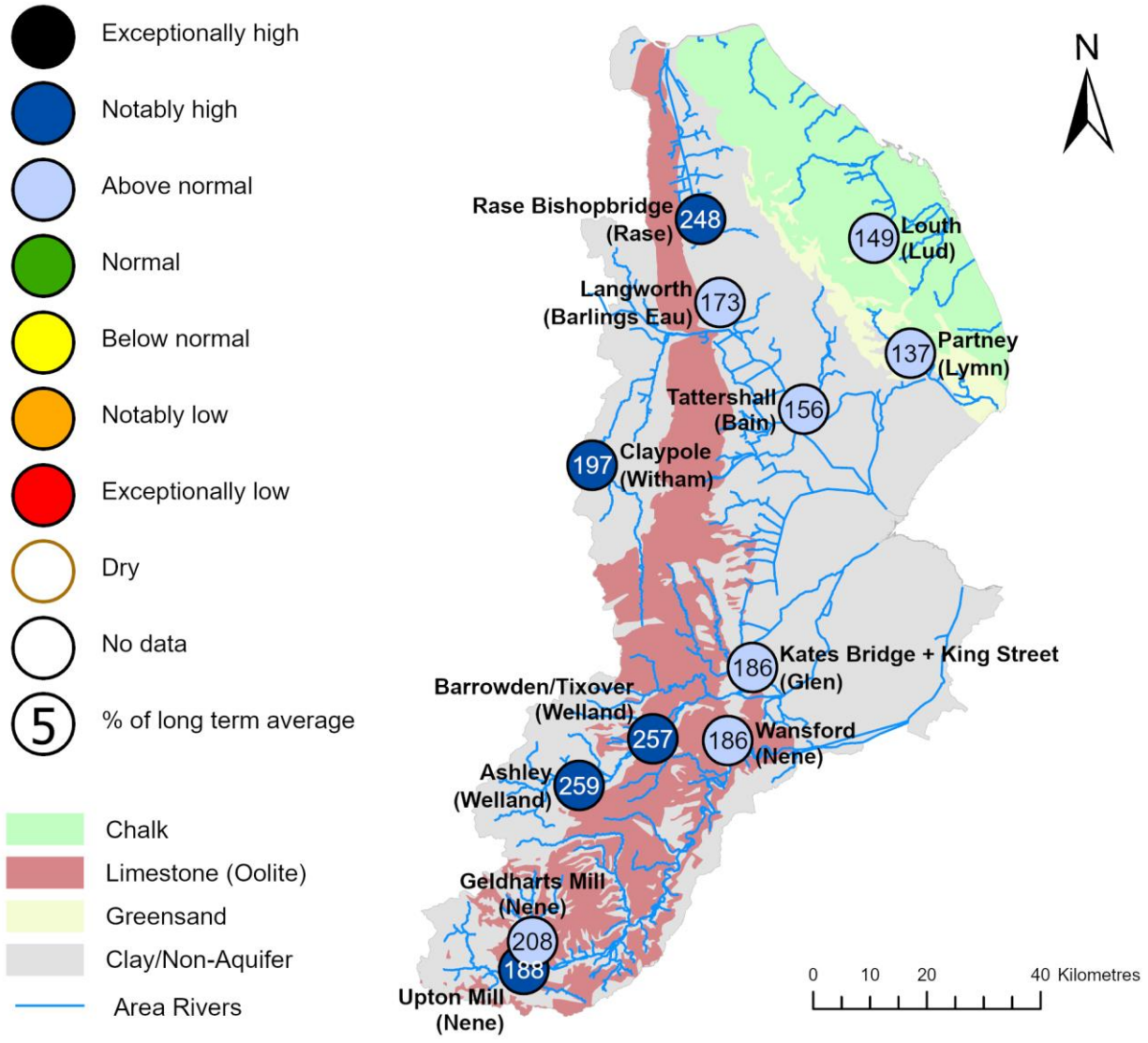
Figure 3.2: Latest soil moisture deficit compared to previous year, maximum, minimum, and 1961 to 1990 long term average. Weekly MORECS data for real land use.



4 River flows

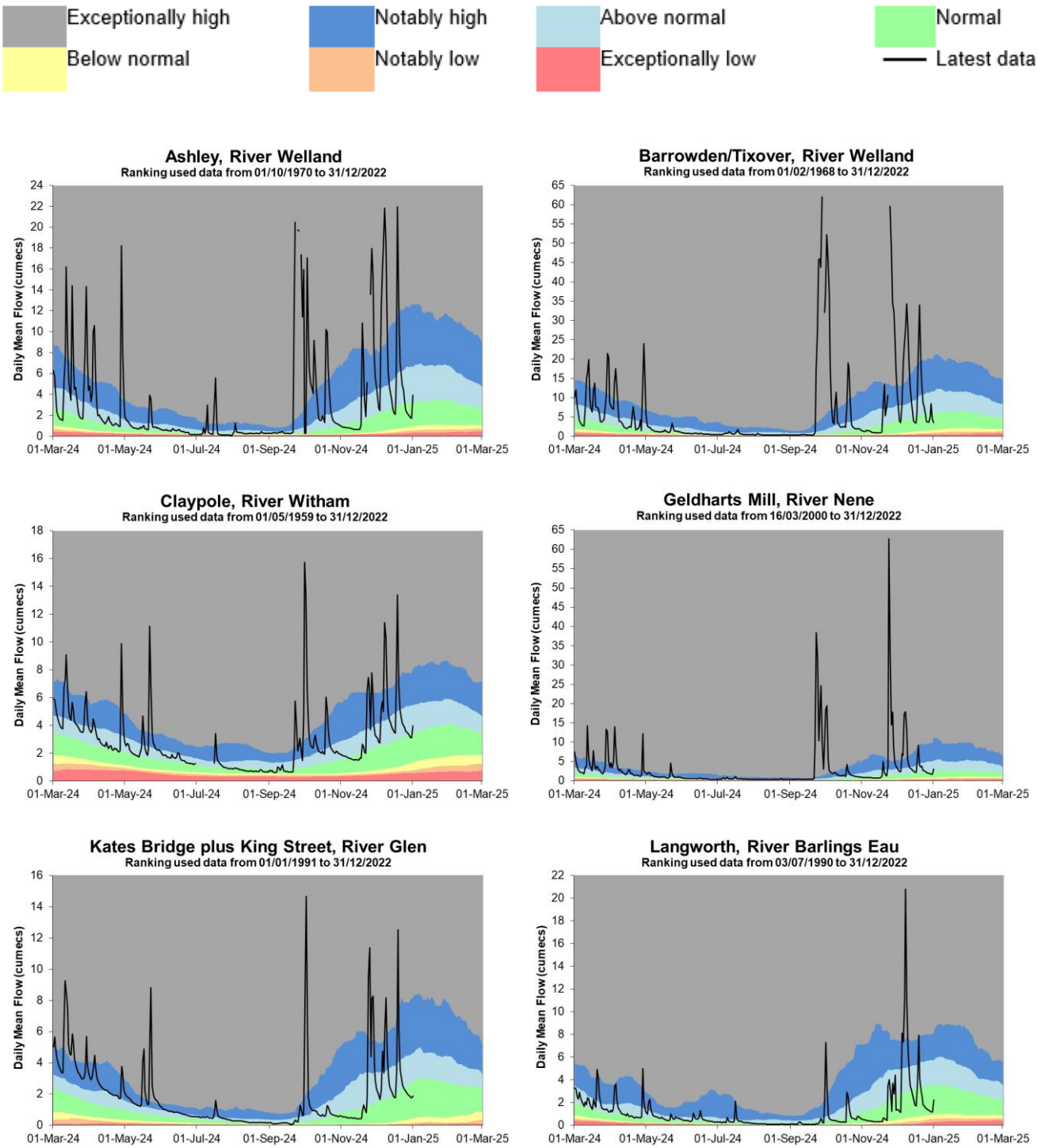
4.1 River flows map

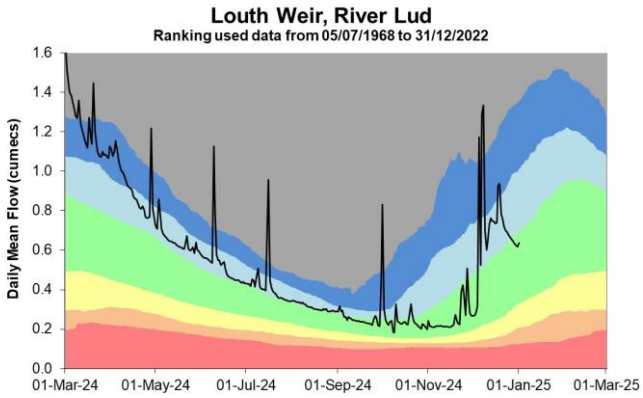
Figure 4.1: Monthly mean river flow for indicator sites for December 2024, expressed as a percentage of the respective long term average and classed relative to an analysis of historic December monthly means Table available in the appendices with detailed information.

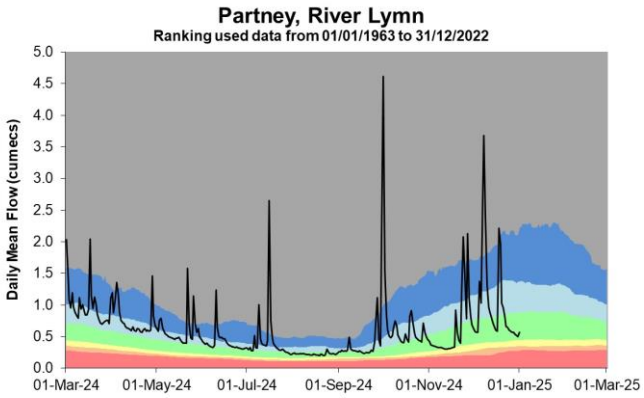


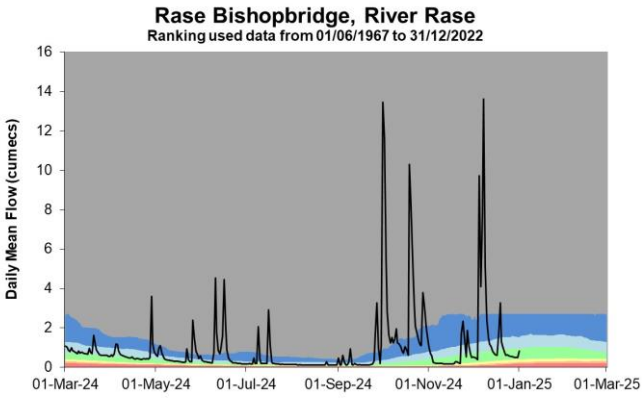
4.2 River flow charts

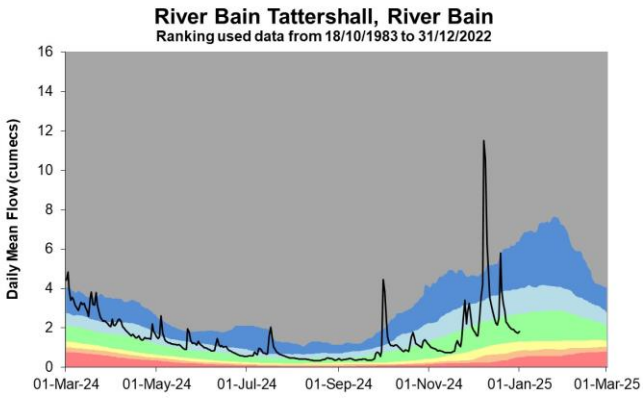
Figure 4.2: Daily mean river flow for index sites over the past year, compared to an analysis of historic daily mean flows, and long term maximum and minimum flows.

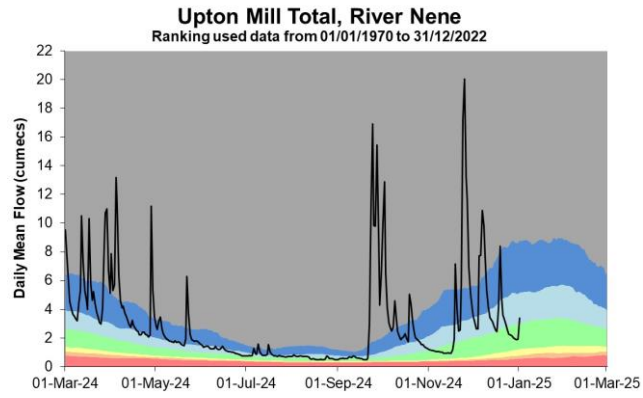


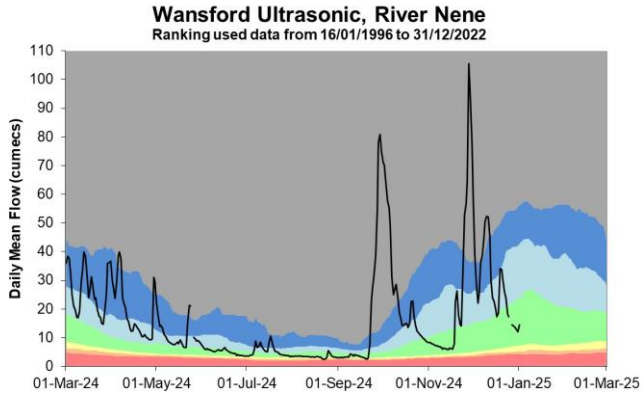










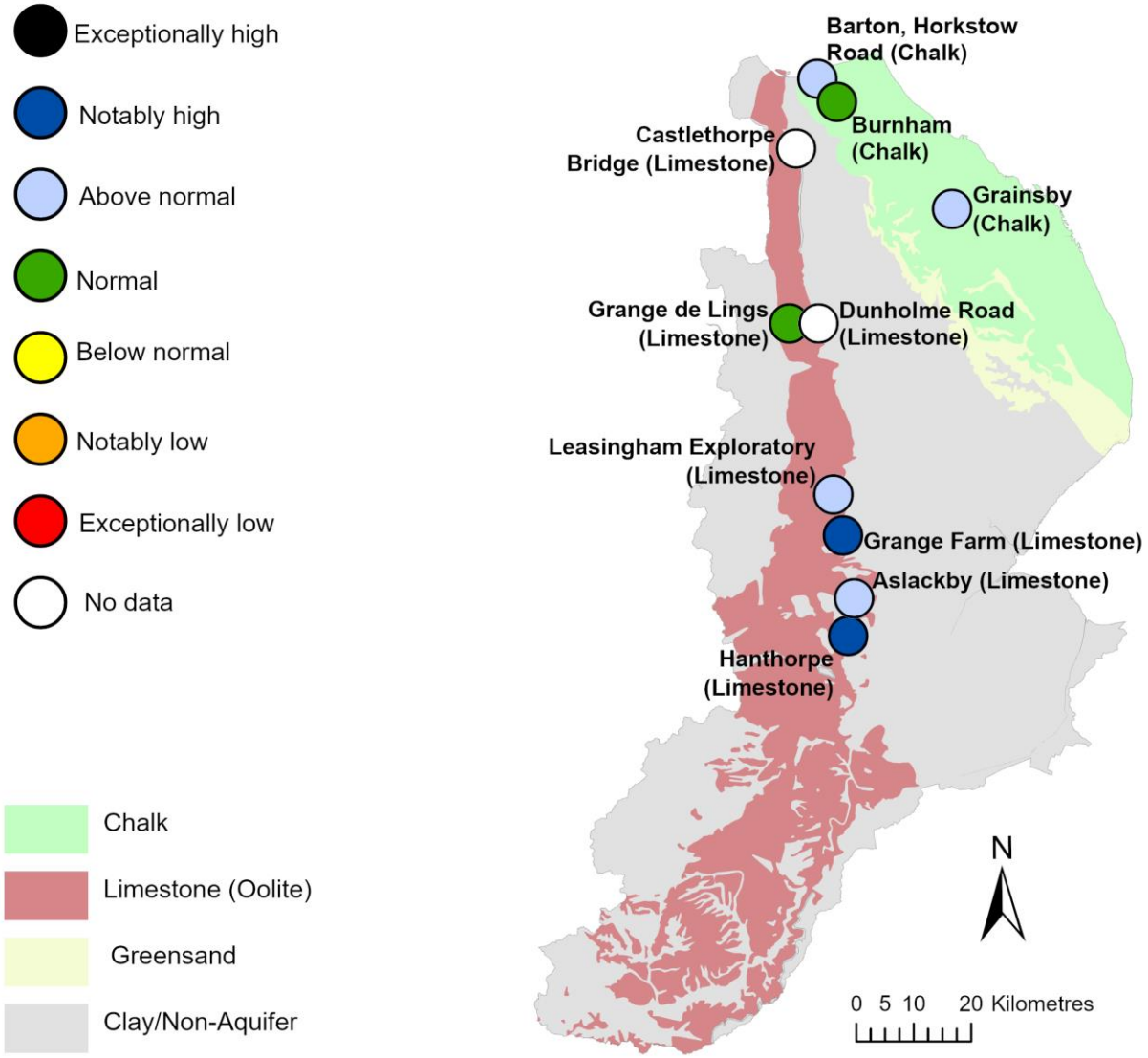


Source: Environment Agency.

5 Groundwater levels

5.1 Groundwater levels map

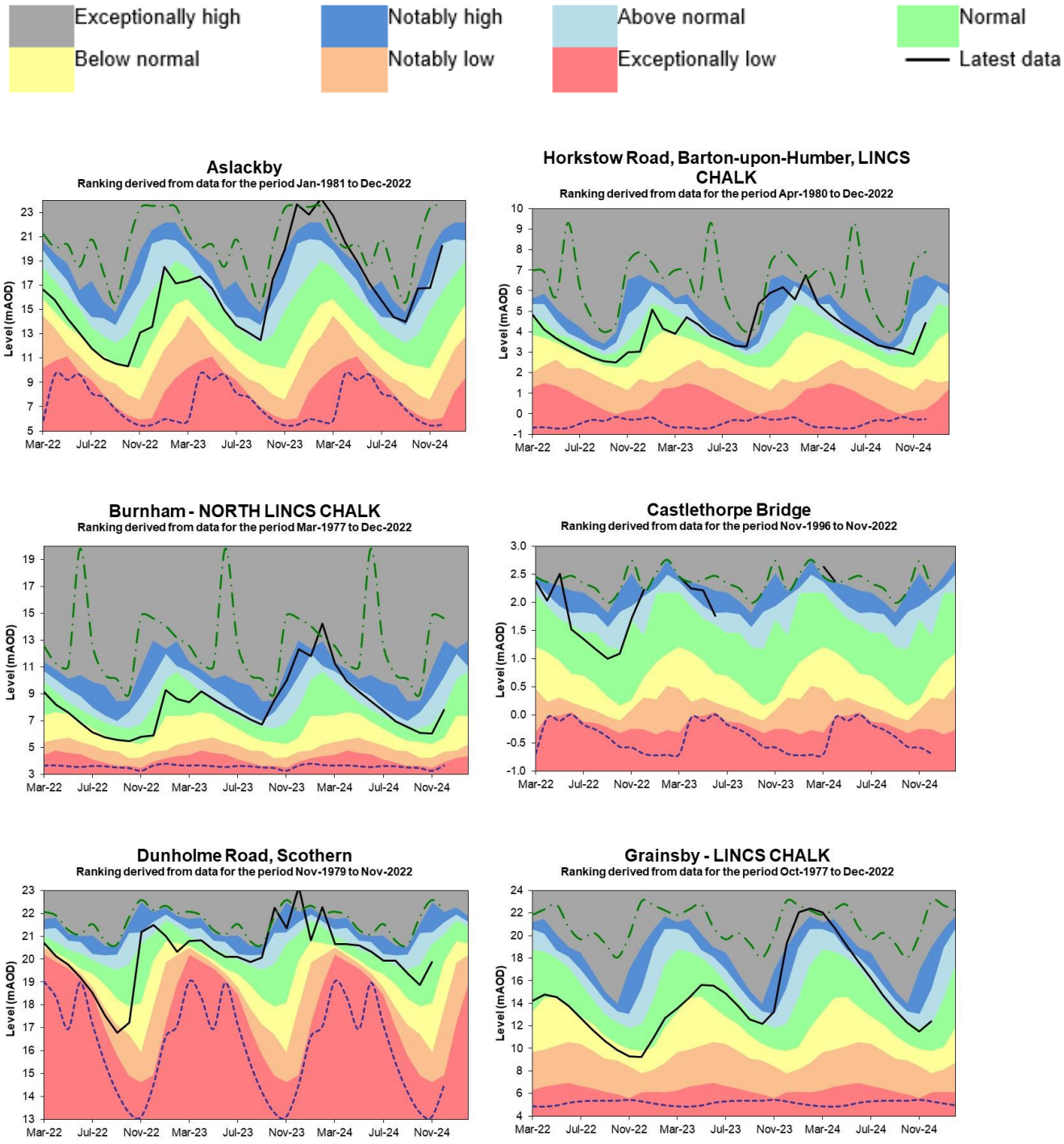
Figure 5.1: Groundwater levels for indicator sites at the end of December 2024, classed relative to an analysis of respective historic December levels. Table available in the appendices with detailed information.

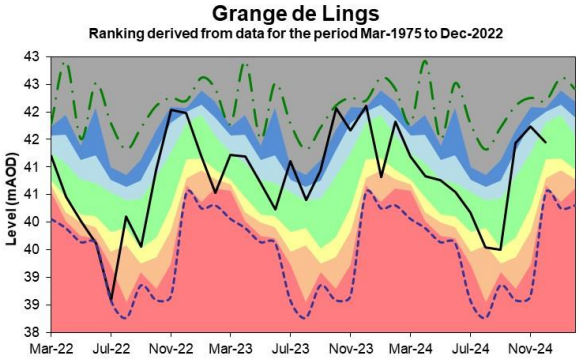


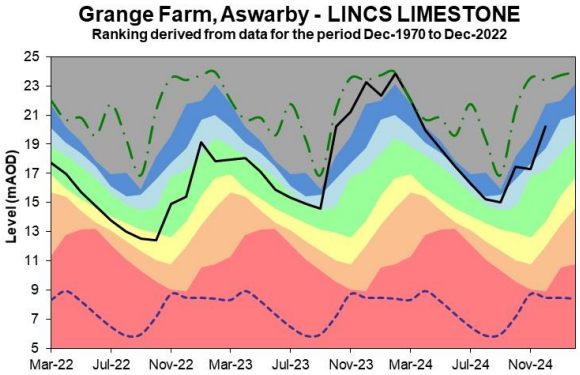
(Source: Environment Agency). Geological map reproduced with kind permission from UK Groundwater Forum, BGS copyright NERC. Crown copyright. All rights reserved. Environment Agency, 100024198, 2025.

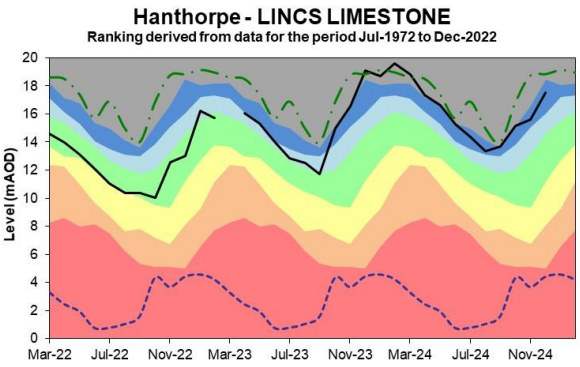
5.2 Groundwater level charts

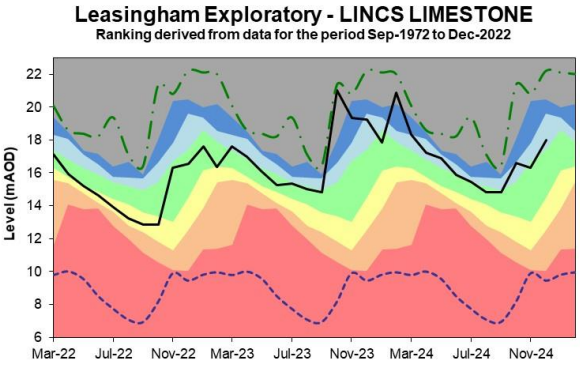
Figure 5.2: End of month groundwater levels at index groundwater level sites for major aquifers. 22 months compared to an analysis of historic end of month levels and long term maximum and minimum levels.











Source: Environment Agency, 2025.

6 Reservoir stocks

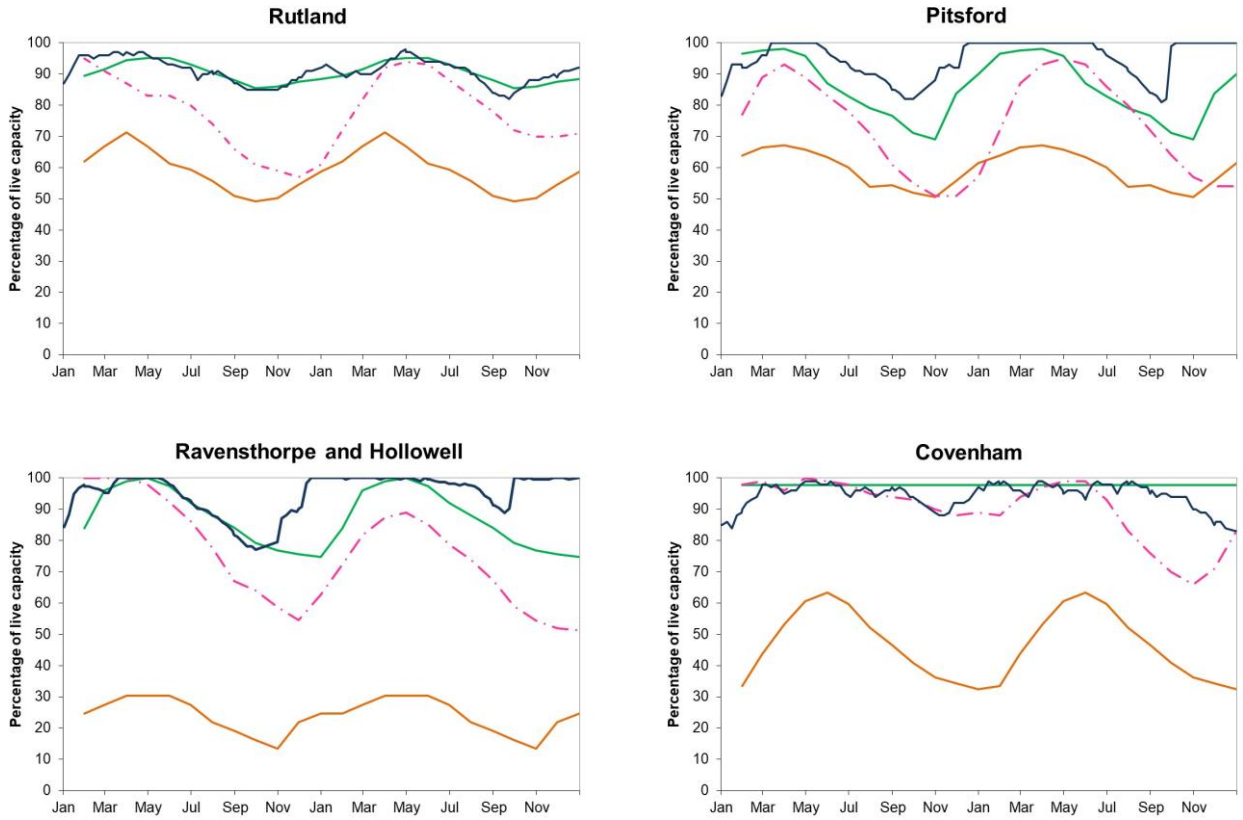


Figure 6.1: End of month regional reservoir stocks compared to the normal operating curve,

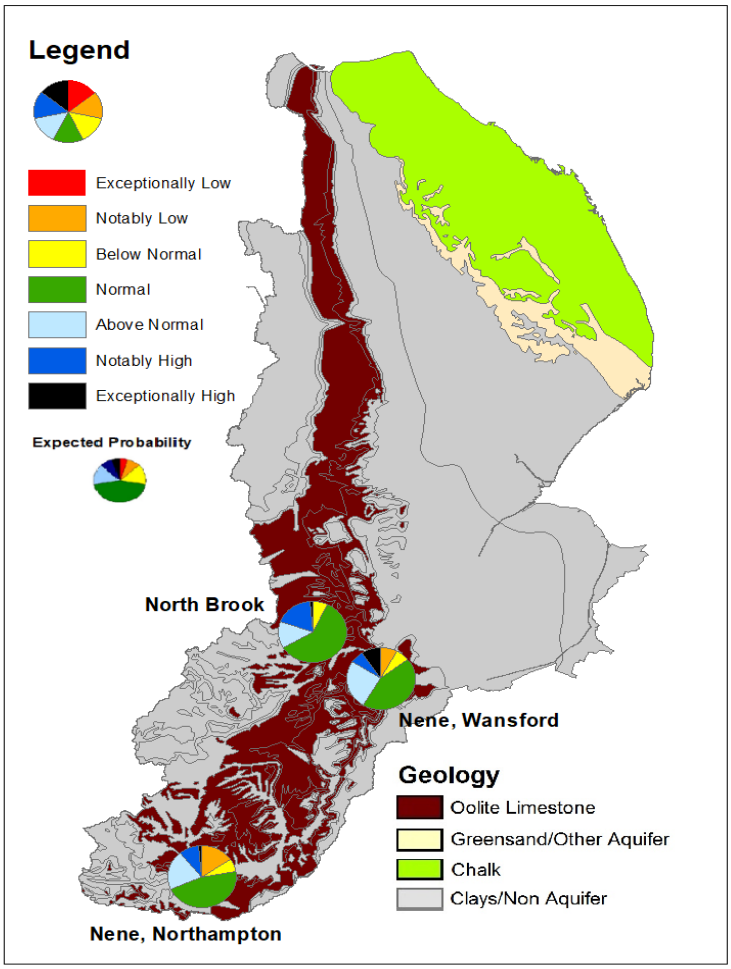
2023-2024 Normal Operating Curve Drought Alert Curve 1995-1996

(Source: water companies).

7 Forward Look

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

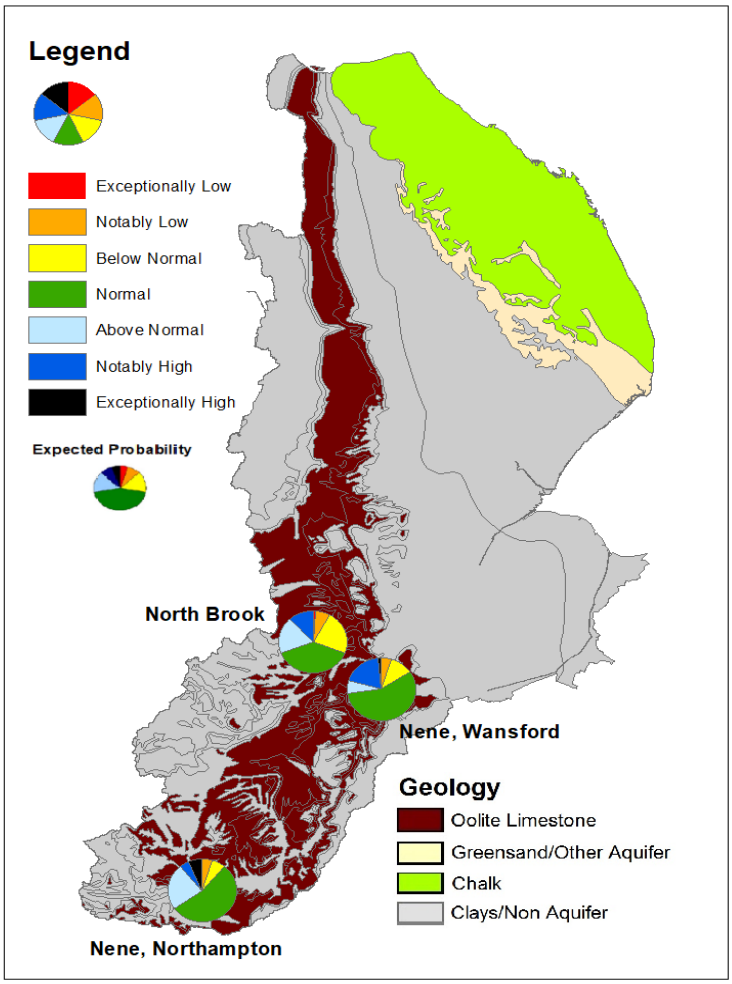
Table available in the appendices with detailed information. Exceptionally high or low levels are those which would typically occur 5% of the time within the historic record. Notably high or low levels are those which would typically occur 8% of the time. Above normal or below normal levels are those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

7.2 Probabilistic ensemble projection of river flows at key sites in June 2025

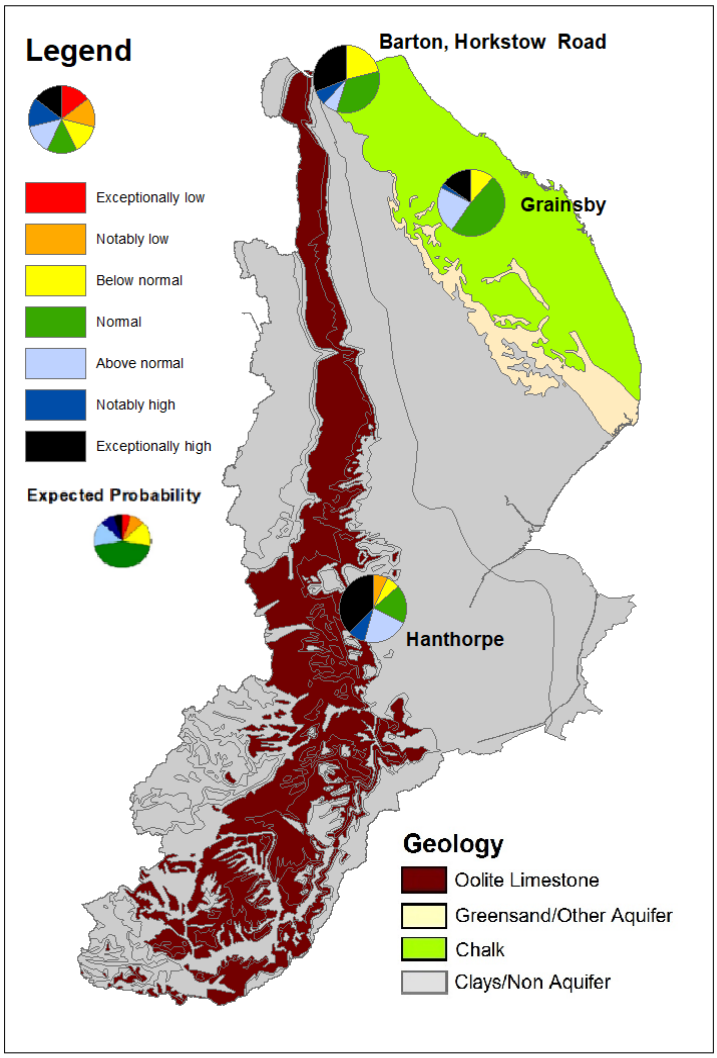
Table available in the appendices with detailed information. Exceptionally high or low levels are those which would typically occur 5% of the time within the historic record. Notably high or low levels are those which would typically occur 8% of the time. Above normal or below normal levels are those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

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

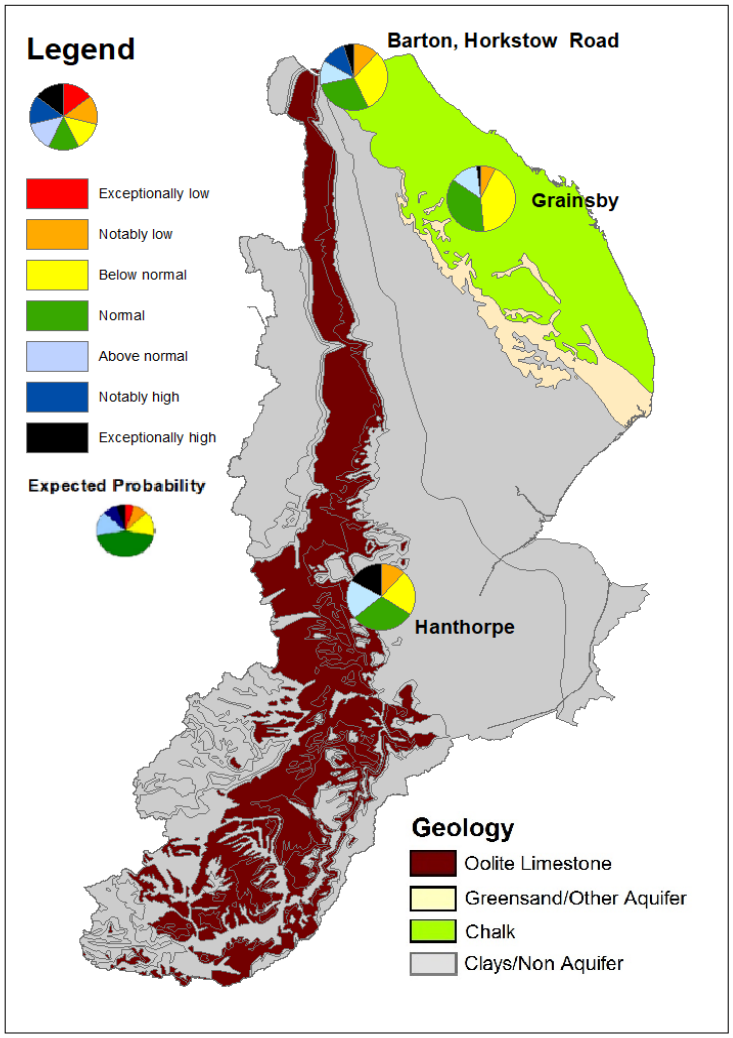
Table available in the appendices with detailed information. Exceptionally high or low levels are those which would typically occur 5% of the time within the historic record. Notably high or low levels are those which would typically occur 8% of the time. Above normal or below normal levels are those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

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, 2025

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	Dec 2024 rainfall % of long term average 1961 to 1990	Dec 2024 band	Oct 2024 to December cumulative band	Jul 2024 to December cumulative band	Jan 2024 to December cumulative band
Louth Grimsby And Ancholme	135	Above Normal	Normal	Normal	Above normal
Lower Welland And Nene	117	Normal	Normal	Above normal	Exceptionally high
South Forty Foot And Hobhole	127	Normal	Normal	Above normal	Exceptionally high
Steeping Great Eau And Long Eau	127	Above Normal	Normal	Normal	Notably high
Upper Welland And Nene	103	Normal	Normal	Notably high	Exceptionally high
Witham To Chapel Hill	124	Above Normal	Normal	Normal	Notably high

9.2 River flows table

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

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

9.3 Groundwater table

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

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

9.4 Ensemble projections tables

9.4.1 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	0.0	0.0	0.0
Notably low	15.9	7.9	0.0
Below normal	6.3	6.3	6.9
Normal	46.0	44.4	59.7
Above normal	20.6	25.4	13.9
Notably high	9.5	6.3	18.1
Exceptionally high	1.6	9.5	1.4

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

Percentage of pie chart for each band

Site	Nene Nton	Nene Wansford	North Brook
Exceptionally low	0.0	0.0	1.3
Notably low	4.8	4.8	6.7
Below normal	6.3	11.1	22.7
Normal	54.0	57.1	38.7
Above normal	23.8	6.3	18.7
Notably high	4.8	19.0	12.0
Exceptionally high	6.3	1.6	0.0

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