

# Monthly water situation report: North East

## 1 Summary – September 2024

The first 3 weeks of September were dry with little rainfall recorded. A prolonged rainfall event impacted parts of the North East area from 25 to 27 September. Monthly rainfall totals therefore varied across the area from normal to notably high. Monthly mean river flows also varied and fell within either the normal or above normal ranges. Groundwater levels remained the same as last month, generally falling into the normal or high ranges. Soil moisture deficit (SMD) data recorded an increase in wet soils across the south of the area. Reservoir stocks have generally decreased but remain healthy for the time of year.

### 1.1 Rainfall

Monthly rainfall totals were classed as below the long term average (LTA) for the Tweed, Tyne and Northumbria North Sea Tribs catchments. Totals were classed as above average for the Wear, Seaham and Tees catchments. September rainfall totals were classed as notably high for the Tees catchment, above normal for the Wear and Seaham catchments and normal for the Tyne, Tweed and Northumbria North Sea Tribs. Monthly rainfall totals ranged from 79% of the LTA in the Northumbria North Tribs catchment to 174% of the LTA in the Seaham catchment.

Analysis of the daily rainfall shows very little rainfall was recorded across the area in the first 23 days of September. Significant rainfall was recorded in the southern part of the North East area in the final week of September with prolonged rainfall recorded from 25 to 27 September. This rainfall event was particularly impactful in the Redcar and Cleveland area and parts of North Yorkshire. Some very high rainfall accumulations were recorded during this period with 134% of the LTA monthly rainfall recorded in a 24 hour period at Easby rain gauge in the lower Tees on 26 September.

Cumulative 12 month rainfall totals show that all catchments in the North East area recorded exceptionally high totals.

### 1.2 Soil moisture deficit

Soils are classed as wet across the west and south of the area. Soils are classed as dry in the Till and Northumberland coastal catchments at the end of September.

### 1.3 River flows

Monthly mean river flows have increased this month at all indicator sites and fall within the normal or above normal ranges. Monthly mean flows ranged from 65% of the LTA at Heaton Mill on the River Till to 167% of the LTA at Rutherford Bridge on the River Greta.

Analysis of the daily mean flows shows that flows were in the normal or below normal ranges at the start of the month. Daily mean flows generally remained in the normal range for the first 3 weeks following a period of little recorded rainfall across the area. In response to the prolonged rainfall event from 25 to 27 September river flows increased at all indicator sites with the greatest peaks observed in the lower Tees catchment. Great Ayton on the River Leven recorded its fifth highest peak river level since records began in 2001. Flows generally remained high and indicator sites fell within the normal or above normal ranges by the end of the month.

### 1.4 Groundwater levels

Groundwater levels across all reporting boreholes have remained in the same category since last month. West Hall Farm on the Wear Magnesian Limestone, Aycliffe NRA2 on the Skerne Magnesian Limestone and Royal Observation on the Till Fell Sandstone remain in the exceptionally high range. Townlaw on the Fell sandstone remains at below normal levels. Red Lion on the Magnesian Limestone remains normal.

### 1.5 Reservoir stocks

All reservoirs in the area have seen a decrease in stocks this month, with the exception of Durham group which has recorded an increase. Overall, reservoir stocks remain healthy and are above average for the time of year.

| Reservoir or reservoir group | Percentage of current stocks | Percentage of previous month stocks |
|------------------------------|------------------------------|-------------------------------------|
| Kielder                      | 80.2                         | 87.3                                |
| North Tynedale group         | 69.6                         | 74.2                                |
| Derwent                      | 76.4                         | 81.4                                |

|                       |      |      |
|-----------------------|------|------|
| Durham group          | 79.6 | 74.6 |
| Lune and Balder group | 82   | 82.4 |
| Cow Green             | 99.7 | 100  |

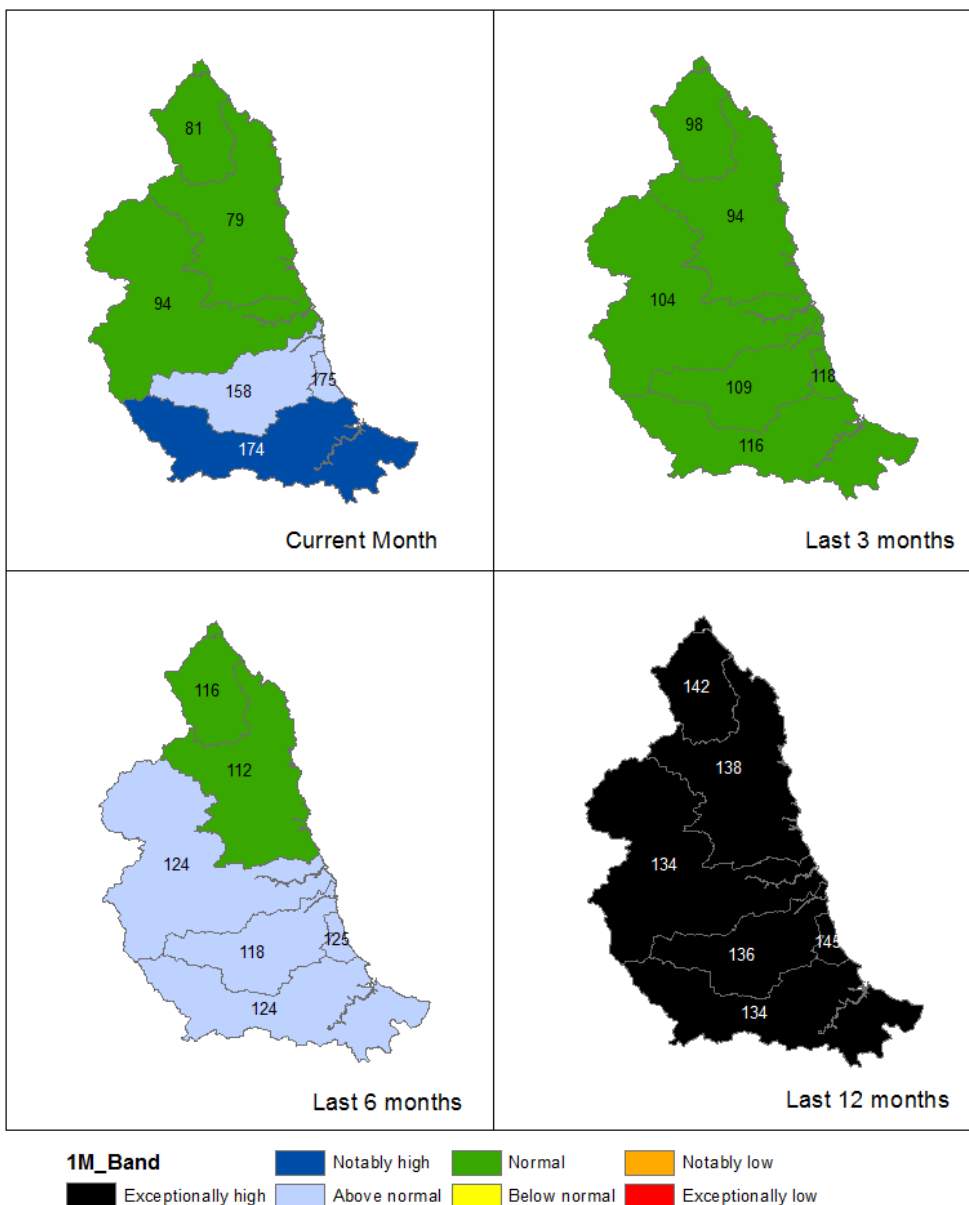
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## 2 Rainfall

### 2.1 Rainfall map

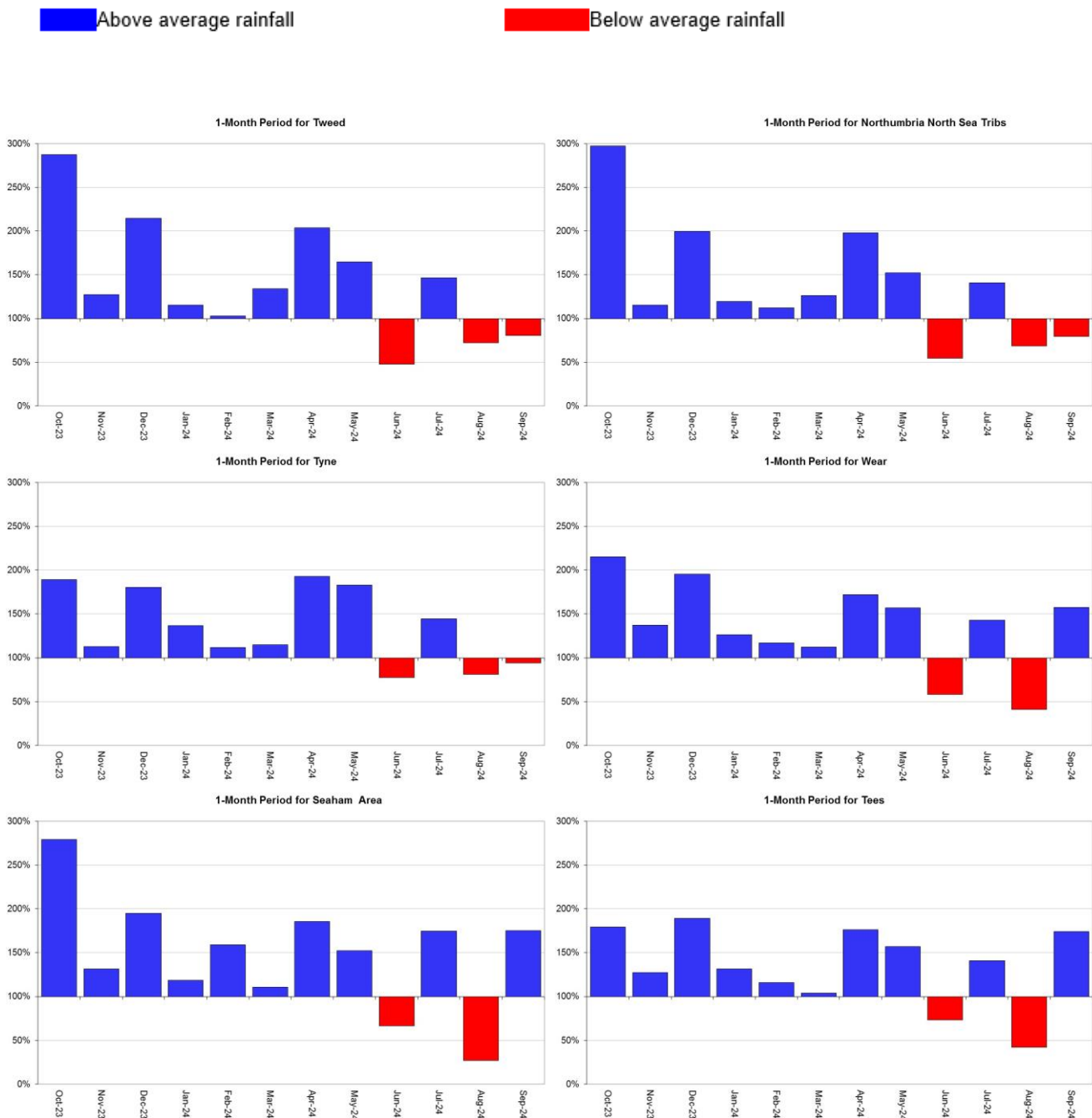
Figure 2.1: Total rainfall for hydrological areas for the current month (up to 30 September 2024), the last 3 months, the last 6 months, and the last 12 months, classed relative to an analysis of respective historic totals. September rainfall totals were classed as notably high for the Tees catchment, above normal for the Wear and Seaham catchments and normal for the Tweed, Tyne and Northumbria North Sea Tribs catchments. Table available in the appendices with detailed information.



Rainfall data for 2024, extracted from Environment Agency 1km gridded rainfall dataset derived from Environment Agency intensity rain gauges. (Source: Environment Agency. Crown Copyright, 100024198, 2024). Rainfall data prior to 2023, extracted from Met Office HadUK 1km gridded rainfall dataset derived from registered rain gauges (Source: Met Office. Crown copyright, 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 hydrometric area in the North East. Monthly rainfall totals are classed as below average for the Tweed, Tyne and Northumbria North Sea Tribs catchments. Monthly rainfall totals are classed as above average for the Wear, Seaham and Tees catchments for September.



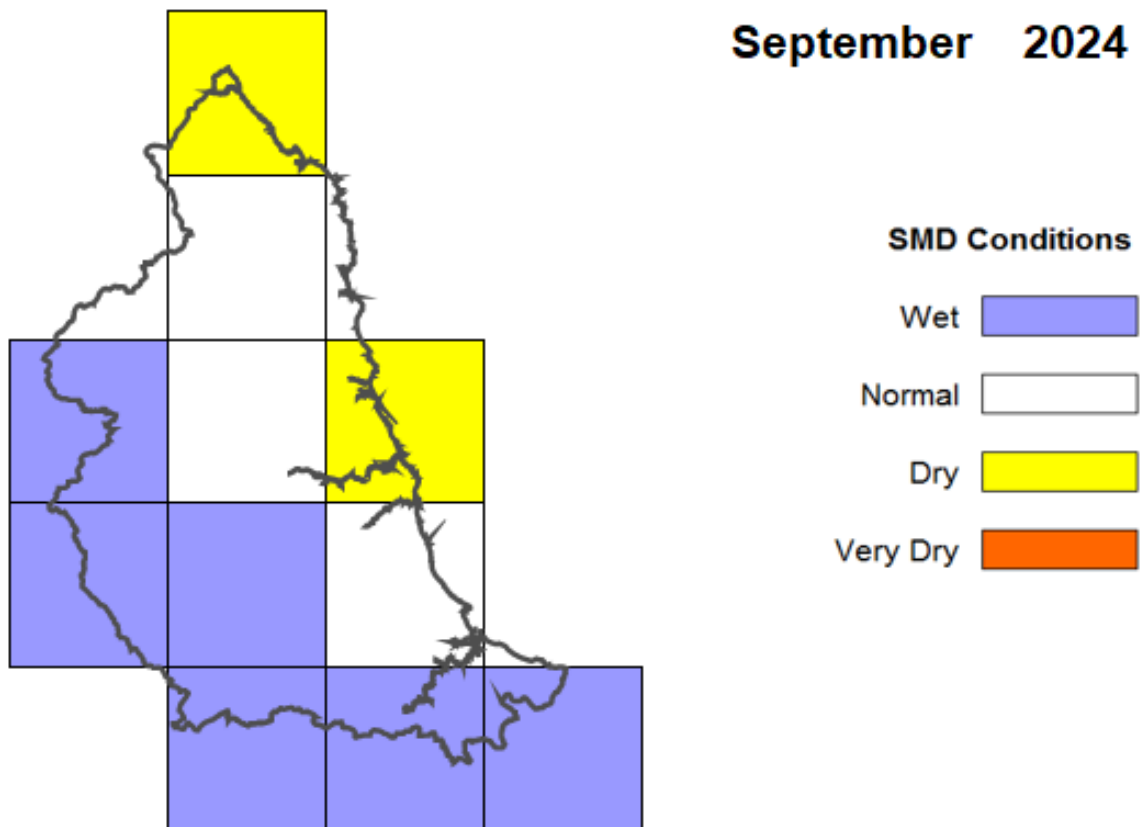
Rainfall data for 2024, extracted from Environment Agency 1km gridded rainfall dataset derived from Environment Agency intensity rain gauges. (Source: Environment Agency. Crown Copyright, 100024198, 2024). Rainfall data prior to 2023, extracted from Met Office HadUK 1km gridded rainfall dataset derived from registered rain gauges (Source: Met Office. Crown copyright, 2024).

### 3 Soil moisture deficit

#### 3.1 Soil moisture deficit map

Figure 3.1: Soil moisture deficits for weeks ending 30 September. MORECS data for real land use. Soils are classed as wet across the west and south of the area. Soils are classed as dry in the Till and lowerTyne catchments.

## Environment Agency - North East Area Monthly MORECS SMD Levels



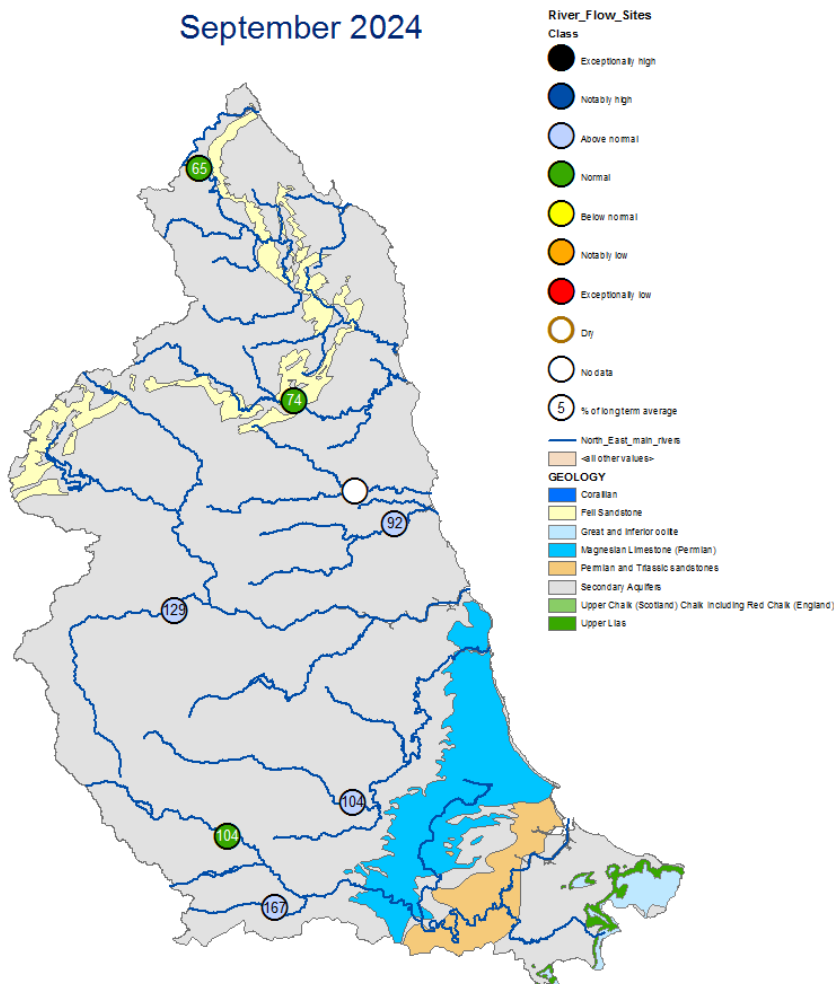
(Source: Met Office. Crown copyright, 2024). All rights reserved. Environment Agency, 100024198, 2024.



## 4 River flows

### 4.1 River flows map

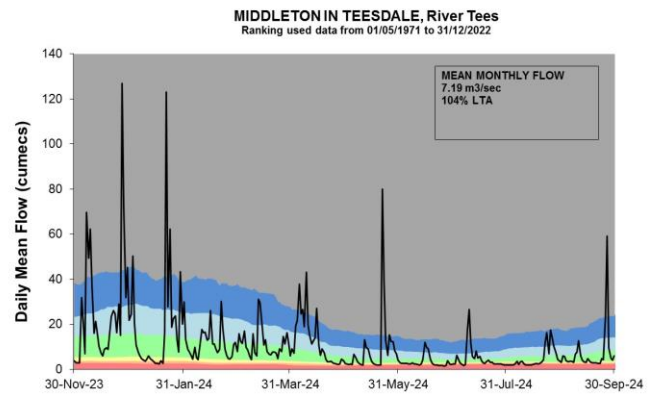
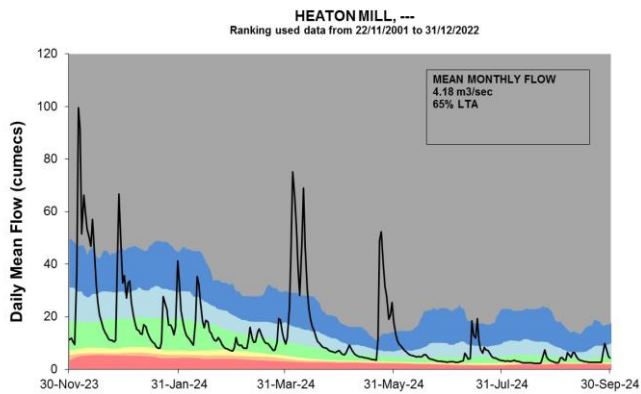
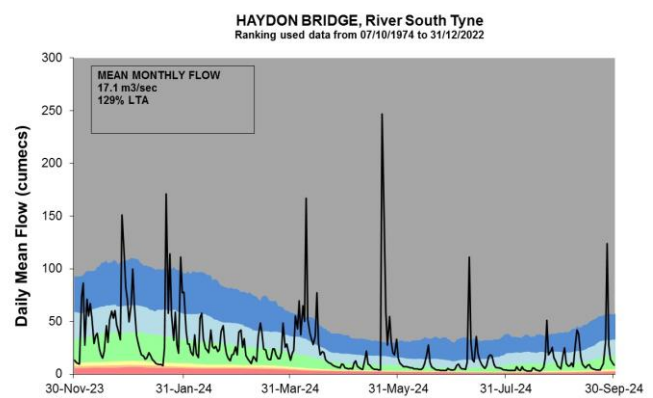
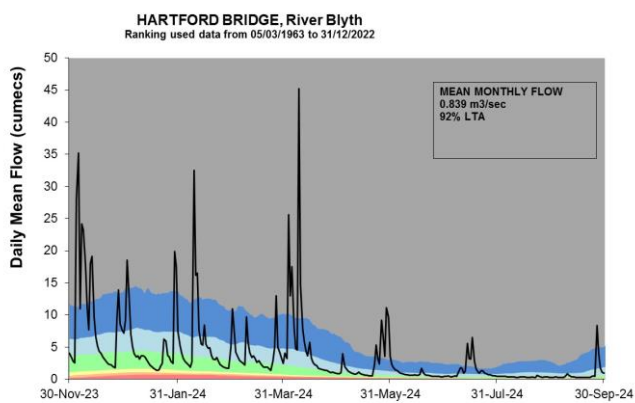
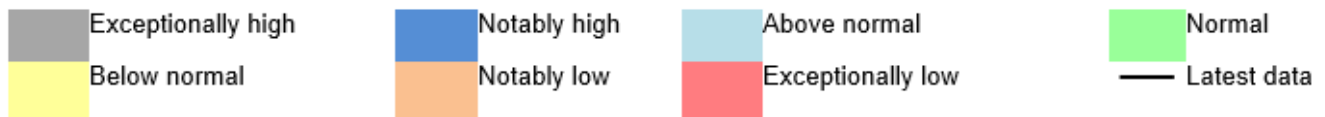
Figure 4.1: Monthly mean river flow for indicator sites for September 2024, expressed as a percentage of the respective long term average and classed relative to an analysis of historic September monthly means. Monthly means are classed as normal at Heaton Mill, Middleton in Teesdale and Rothbury. Flows are classed as above normal at Hartford Bridge, Haydon Bridge, Rutherford Bridge and Witton Park. There are current ongoing data quality issues at Mitford on the River Wansbeck and therefore the site is marked as no data for the month. Table available in the appendices with detailed information.

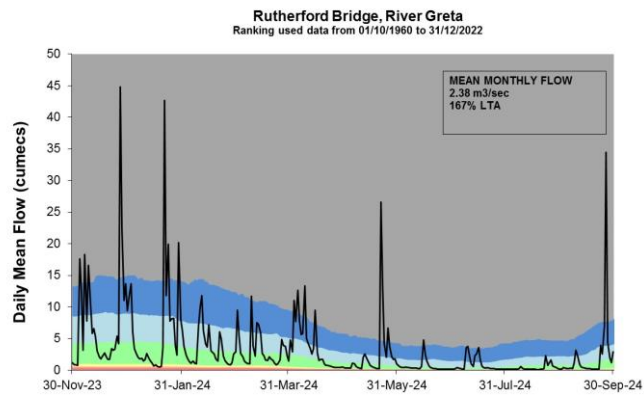
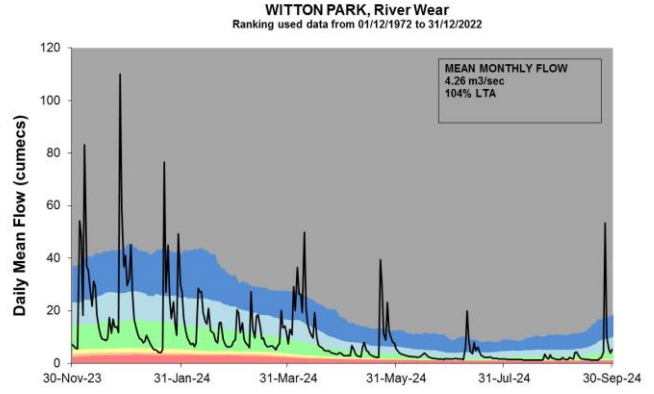
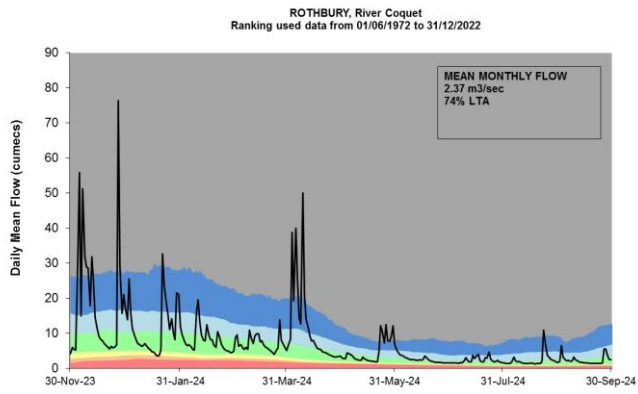


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## 4.2 River flow charts

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.



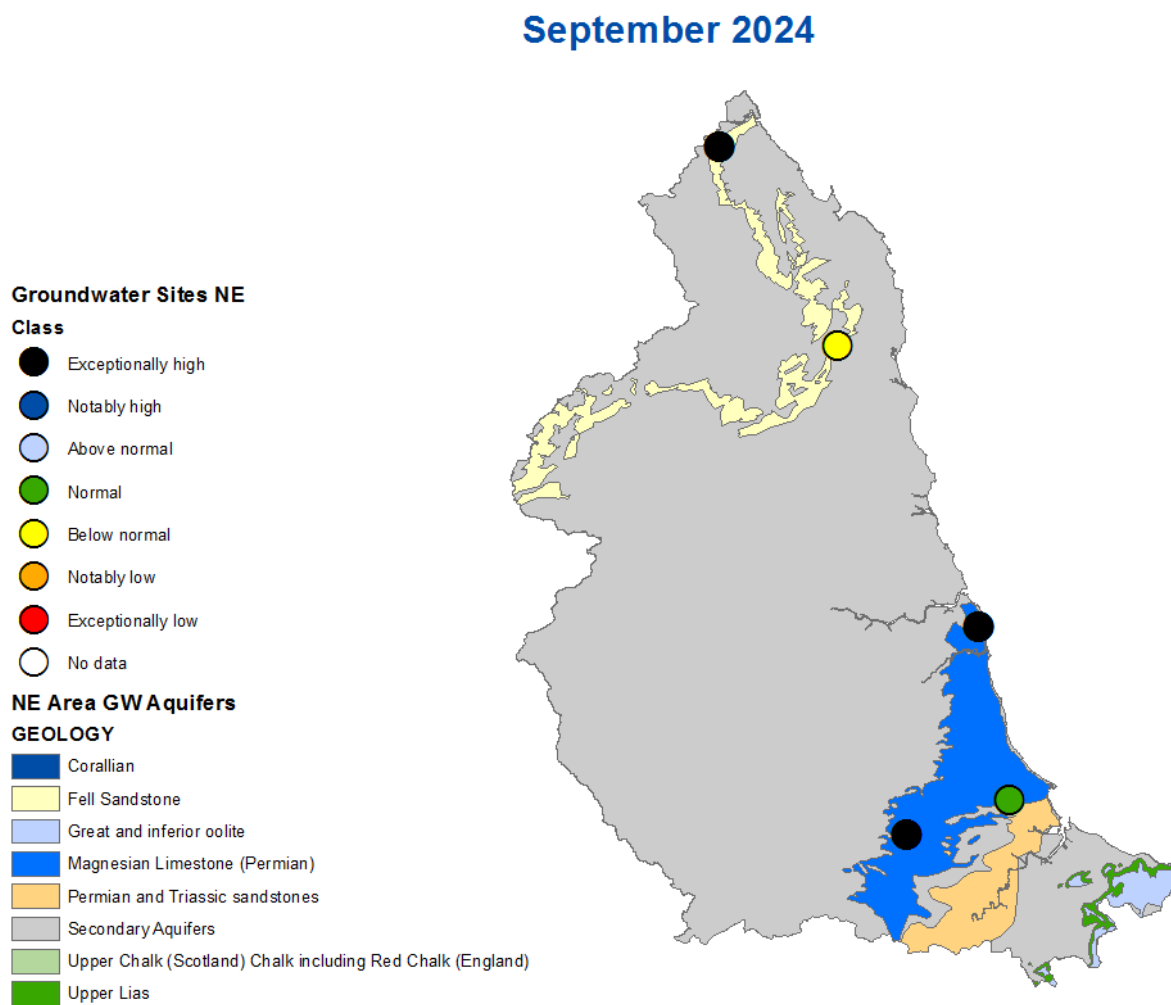


Source: Environment Agency, 2024.

# 5 Groundwater levels

## 5.1 Groundwater levels map

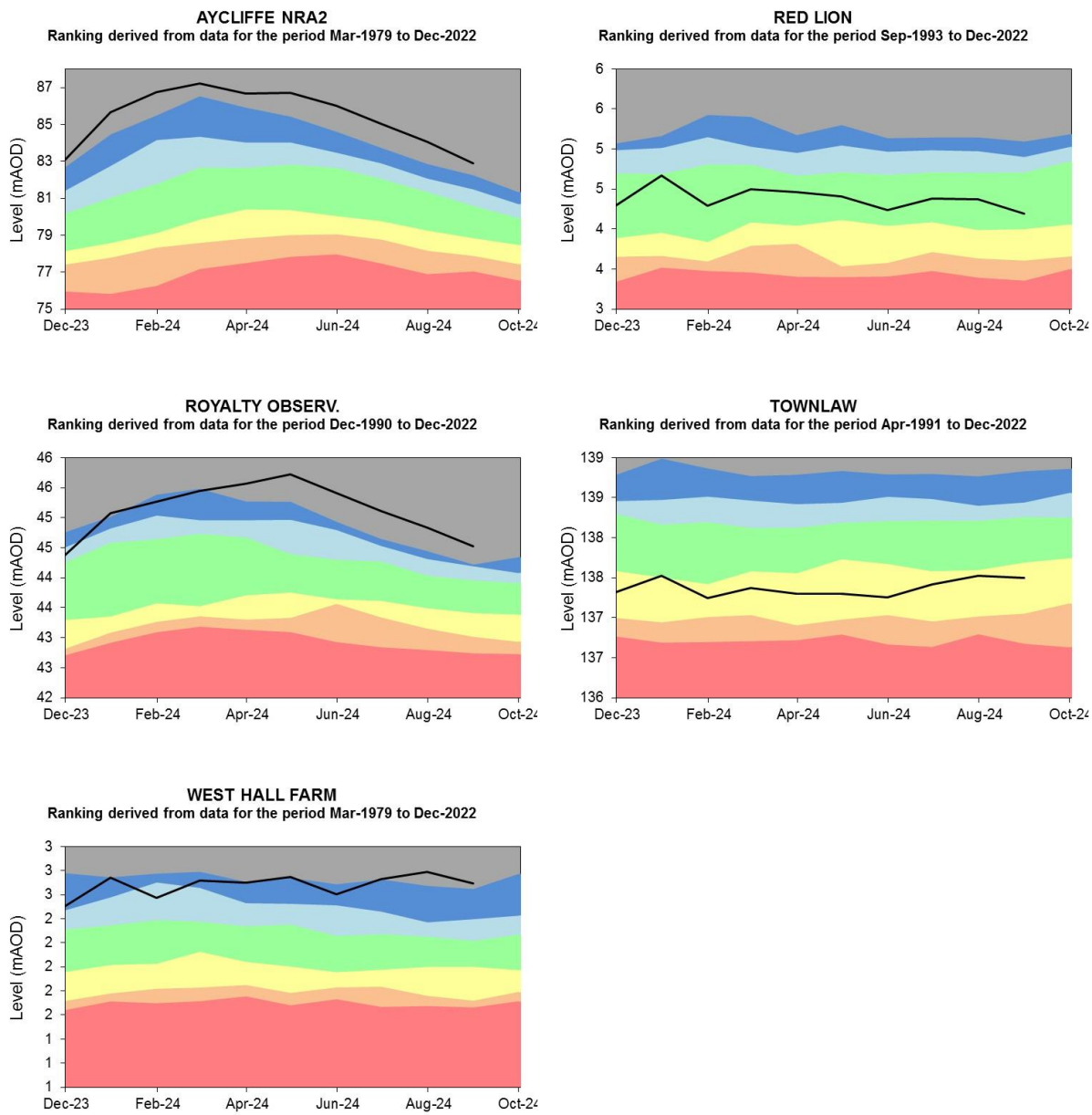
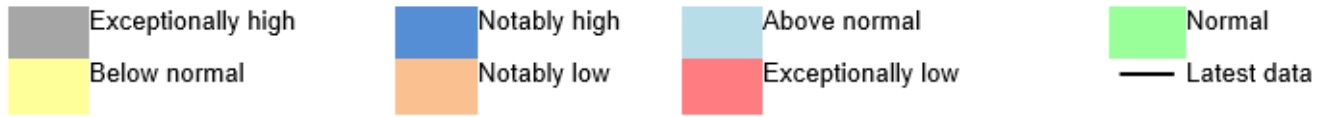
Figure 5.1: Groundwater levels for indicator sites at the end of September 2024, classed relative to an analysis of respective historic September levels. Indicator sites fall within the exceptionally high, normal, and below normal ranges. Table available in the appendices with detailed information.



(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

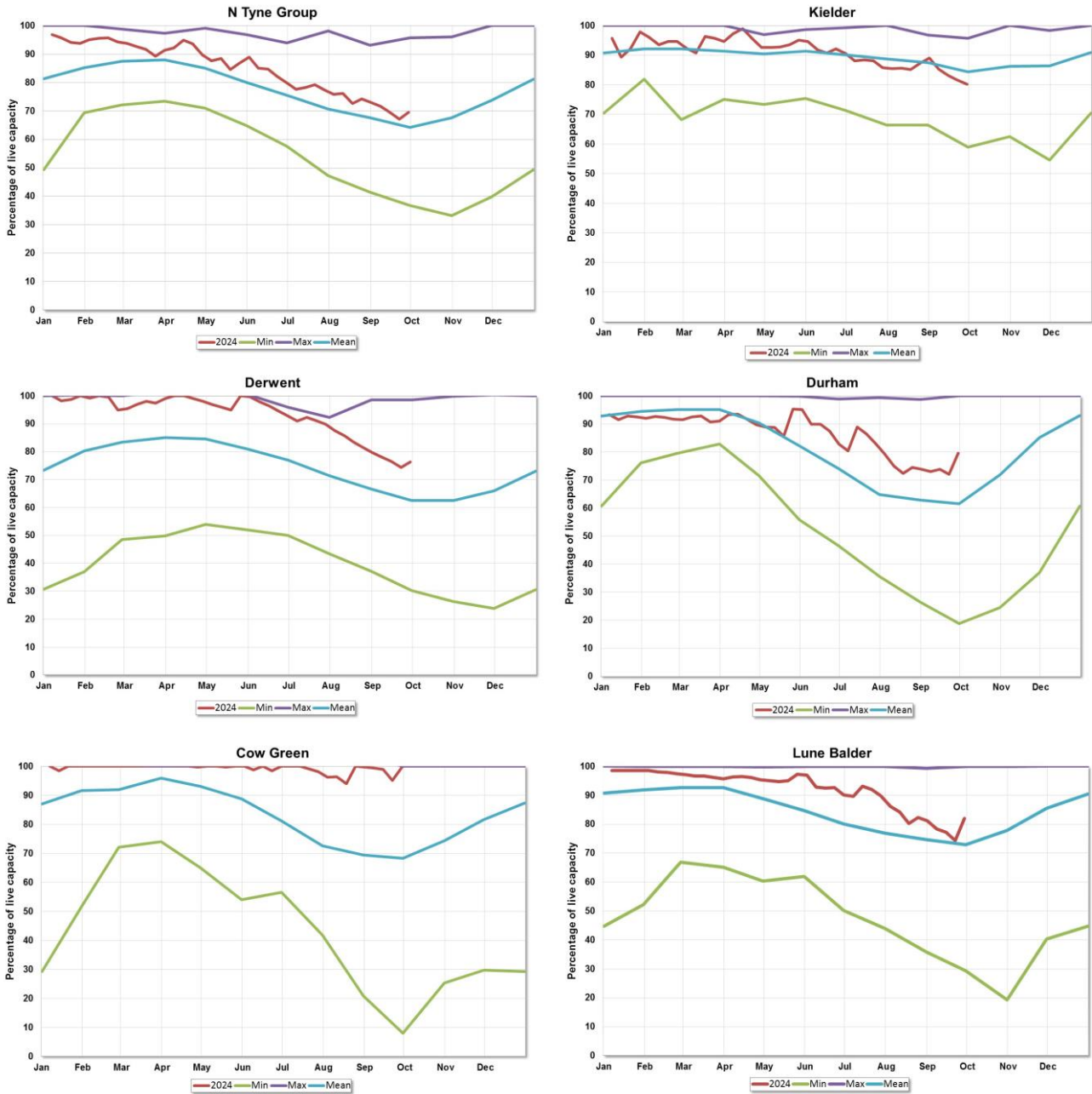
Figure 5.2: End of month groundwater levels at index groundwater level sites for major aquifers in the North East. 12 months compared to an analysis of historic end of month levels and long term maximum and minimum levels.



Source: Environment Agency, 2024.

## 6 Reservoir stocks

Figure 6.1: End of month reservoir stocks compared to long term maximum, minimum and average stocks. Note: Historic records of individual reservoirs and reservoir groups vary in length.



(Source: Water Company).

## 7 Glossary

### 7.1 Terminology

#### **Aquifer**

A geological formation able to store and transmit water.

#### **Areal average rainfall**

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

#### **Artesian**

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

#### **Artesian borehole**

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

#### **Cumecs**

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

#### **Effective rainfall**

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

#### **Flood alert and flood warning**

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

#### **Groundwater**

The water found in an aquifer.

### **Long term average (LTA)**

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

### **mAOD**

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

### **MORECS**

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

### **Naturalised flow**

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

### **NCIC**

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

### **Recharge**

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

### **Reservoir gross capacity**

The total capacity of a reservoir.

### **Reservoir live capacity**

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

### **Soil moisture deficit (SMD)**

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



## 7.2 Categories

### **Exceptionally high**

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

### **Notably high**

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

### **Above normal**

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

### **Normal**

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

### **Below normal**

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

### **Notably low**

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

### **Exceptionally low**

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

## 8 Appendices

### 8.1 Rainfall table

| Hydrological area           | September 2024 rainfall % of long term average 1961 to 1990 | September 2024 band | July 2024 to September 2024 cumulative band | April 2024 to September 2024 cumulative band | October 2023 to September 2024 cumulative band |
|-----------------------------|---|---------------------|---|--|--|
| Northumbria North Sea Tribs | 79  | Normal              | Normal                                      | Normal                                       | Exceptionally high                             |
| Seaham Area                 | 175   | Above Normal        | Normal                                      | Above normal                                 | Exceptionally high                             |
| Tees                        | 174   | Notably High        | Normal                                      | Above normal                                 | Exceptionally high                             |
| Tweed                       | 81  | Normal              | Normal                                      | Normal                                       | Exceptionally high                             |
| Tyne                        | 94  | Normal              | Normal                                      | Above normal                                 | Exceptionally high                             |
| Wear                        | 158   | Above Normal        | Normal                                      | Above normal                                 | Exceptionally high                             |

## 8.2 River flows table

| Site name             | River      | Catchment  | September 2024 band | August 2024 band |
|-----------------------|------------|------------|---------------------|------------------|
| Hartford Bridge       | Blyth      | Blyth      | Above normal        | Normal           |
| Haydon Bridge         | South Tyne | South Tyne | Above normal        | Normal           |
| Heaton Mill           | Till       | Till       | Normal              | Below normal     |
| Middleton In Teesdale | Tees       | Tees       | Normal              | Normal           |
| Mitford               | Wansbeck   | Wansbeck   | No data             | No data          |
| Rothbury              | Coquet     | Coquet     | Normal              | Normal           |
| Rutherford Bridge     | Greta      | Greta      | Above normal        | Normal           |
| Witton Park           | Wear       | Wear       | Above normal        | Below normal     |

### 8.3 Groundwater table

| Site name       | Aquifer                    | End of September 2024 band | End of August 2024 band |
|-----------------|----------------------------|----------------------------|-------------------------|
| Aycliffe Nra2   | Skerne Magnesian Limestone | Exceptionally high         | Exceptionally high      |
| Red Lion        | Skerne Magnesian Limestone | Normal                     | Normal                  |
| Royalty Observ. | Till Fell Sandstone        | Exceptionally high         | Exceptionally high      |
| Townlaw         | Till Fell Sandstone        | Below normal               | Below normal            |
| West Hall Farm  | Wear Magnesian Limestone   | Exceptionally high         | Exceptionally high      |