Summary – January 2020
Unsettled conditions dominated the first two weeks of January although Yorkshire recorded below average monthly rainfall totals. Monthly river flows for the Pennine fed catchments were in the normal or below normal range and were above normal in the River Hull catchment. Soils were fully saturated, groundwater levels were generally above average and reservoir stocks were close to full capacity throughout the month.

Rainfall
The first half of January, recording 60% to 90% of the monthly total rainfall, was much wetter than the second half. The raingauges around the western uppermost Pennine fed catchments recorded few rain free days throughout the month, measuring just below the long term average (LTA) monthly rainfall totals. More settled conditions prevailed when travelling eastwards away from the Pennines. The central and eastern catchments received below LTA monthly totals with over half of the month recording zero rainfall.

With regards to the catchment average rainfall, as shown in the map below, all catchments recorded below LTA monthly rainfall totals with the eastern groundwater fed catchments receiving less than 60% of the LTA.

Soil Moisture Deficit
The soils were almost fully saturated at the start of January and the rain that did fall ensured that they remained wet throughout the month and reached full saturation by the end of January.

River Flows
Monthly mean river flows were in the normal range in South and West Yorkshire and in the Rye and Derwent catchments, while North Yorkshire generally experienced below normal flow conditions. The Hull and Humber catchment was still experiencing a high baseflow contribution and recorded a monthly mean flow above the normal range.

In the Pennine fed catchments, the general trend during the first week was of flows declining slowly into the below normal range expected for the time of year. The rivers then quickly responded to episodes of significant rainfall and recorded a series of noticeably higher flow peaks occurring between the 9th and the 15th of the month. Once the rain eased during the second half of the month, the rivers began to recede quickly. After some fluctuations in response to low intensity rainfall, river flows increased during the last couple of days of the month in response to another wet period. Declining flows in the River Derwent and River Rye were also halted when a series of higher flow peaks occurred between the 9th to the 15th of the month. However, receding flows then dominated during the second half of the month and the end of January recorded daily mean flows reaching the below normal range.

Flows on the West Beck in the upper Hull catchment were notably high at the beginning of January but declined throughout the month into the normal range expected for the time of year. By mid month, ephemeral reaches of the Gypsey Race chalk stream were flowing strongly at locations where flow is unusual, historically occurring only when groundwater levels in the north of the East Yorkshire chalk are particularly high.

Flows in Mires Beck and the River Foulness, in the above normal to notably high range at the beginning of the month, initially declined but then had a series of higher flow peaks occurring between the 9th and the 15th. Afterwards, receding flows then dominated until the end of the month.
Groundwater Levels

**Magnesian Limestone**
The groundwater level at Brick House Farm continued to rise and remained above the average level for the time of year.

**Millstone Grit**
The groundwater level at Hill Top Farm had decreased over the month but still remained just above the average level for the time of year.

**Sherwood Sandstone**
The groundwater level in the Sherwood Sandstone, measured at both Great Ouseburn and Riccal Approach, were at roughly the same levels as December 2019 and were well above the average for the time of year.

**Corallian Limestone**
The groundwater level at Sproxton had increased during the month and was just a few centimetres below the average level for the time of year. The levels measured at East Ness had remained the same and were average for the time of year.

**Chalk**
The groundwater level in the northern area of the aquifer, as monitored at Wetwang, continued to decrease but was still above the average level for the time of year. At Dalton Estate in the south of the aquifer the groundwater level had slightly decreased but was still well above the average level for the time of year.

Reservoir Storage

Although Yorkshire experienced below LTA rainfall during January, overall reservoir stocks increased for three weeks before showing a slight decline during the final week. Despite this decline, they remained above the LTA and at near full capacity.

Environmental Impact

One abstraction licence had a Hands off Flow (HOF) in force although it only had to stop for five days. By the end of January, 24 advance warning notifications were issued although they were still able to abstract.

Author: Yorkshire Hydrology
Rainfall

Total rainfall for hydrological areas across England for the current month, the last three months, the last six months, and the last 12 months, classified relative to an average of respective historic rainfall figures. From rainfall data collected by the Met Office (Crown Copyright). Provenance data sourced from Environment Agency, sowie-languages. Crown Copyright, All rights reserved, Environment Agency, 02002060, 2020.

Current Month

Last 3 months

Last 6 months

Last 12 months

Legend:
- Exceptionally high
- Above normal
- Normal
- Below normal
- Exceptionally low
- Notably high
- Notably low

customer service line 03708 506 506
incident hotline 0800 80 70 60
floodline 0345 988 1188
© Environment Agency 2020
Above average rainfall

Below average rainfall

1-Month Period for Swale (NE)

1-Month Period for Ure

1-Month Period for Nidd

1-Month Period for Ouse

1-Month Period for Wharfe

1-Month Period for Dales North Sea Tribs

1-Month Period for Rye

1-Month Period for Derwent (NE)
Above average rainfall

Below average rainfall

Soil Moisture Deficit

Environment Agency - Yorkshire Area

Monthly MORECS SMD Levels

January 2020

SMD Conditions
- Wet
- Normal
- Dry
- Very Dry
Briggswath, ESK
Ranking derived from data for the period Jan-1993 to Dec-2017

Buttercrambe, DERWENT
Ranking derived from data for the period Sep-1973 to Dec-2017

Crakehill Topcliffe, SWALE
Ranking derived from data for the period Jun-1980 to Dec-2017

Doncaster, DON
Ranking derived from data for the period Jul-1959 to Dec-2017

Elland, CALDER
Ranking derived from data for the period Jul-1971 to Dec-2017

Hunsingore, NIDD
Ranking derived from data for the period Oct-1968 to Dec-2017

Kildwick, AIRE
Ranking derived from data for the period Aug-1971 to Dec-2017

Kilgram Bridge, URE
Ranking derived from data for the period Aug-1971 to Dec-2017
Groundwater Levels

Groundwater site

Class:
- Exceptionally high
- Notably high
- Above normal
- Normal
- Below normal
- Notably low
- Exceptionally low
- No data

Brick House Fm
Ranking derived from data for the period Oct-1979 to Nov-2017

Dalton Estate Well
Ranking derived from data for the period Jan-1889 to Nov-2017

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Great Ouseburn
Ranking derived from data for the period Jan-1976 to Nov-2017

Hill Top Fm
Ranking derived from data for the period Oct-1973 to Nov-2017

Riccall Approach Farm
Ranking derived from data for the period Feb-1977 to Nov-2017

Sproston
Ranking derived from data for the period May-1975 to Nov-2017

Wetwang
Ranking derived from data for the period Oct-1971 to Nov-2017
Reservoir Stocks – Data from Water Company

This graph is produced from Yorkshire Water © Crown Copyright data.
## Glossary

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aquifer</td>
<td>A geological formation able to store and transmit water.</td>
</tr>
<tr>
<td>Areal average rainfall</td>
<td>The estimated average depth of rainfall over a defined area. Expressed in depth of water (mm).</td>
</tr>
<tr>
<td>Artesian</td>
<td>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.</td>
</tr>
<tr>
<td>Artesian borehole</td>
<td>Borehole where the level of groundwater is above the top of the borehole and groundwater flows out of the borehole when unsealed.</td>
</tr>
<tr>
<td>Cumecs</td>
<td>Cubic metres per second ($m^3s^{-1}$)</td>
</tr>
<tr>
<td>Effective rainfall</td>
<td>The rainfall available to percolate into the soil or produce river flow. Expressed in depth of water (mm).</td>
</tr>
<tr>
<td>Flood Alert/Flood Warning</td>
<td>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.</td>
</tr>
<tr>
<td>Groundwater</td>
<td>The water found in an aquifer.</td>
</tr>
<tr>
<td>Long term average (LTA)</td>
<td>The arithmetic mean calculated from the historic record, usually based on the period 1961-1990. However, the period used may vary by parameter being reported on (see figure captions for details).</td>
</tr>
<tr>
<td>mAOD</td>
<td>Metres Above Ordnance Datum (mean sea level at Newlyn Cornwall).</td>
</tr>
<tr>
<td>MORECS</td>
<td>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 x 40 km grid.</td>
</tr>
<tr>
<td>Naturalised flow</td>
<td>River flow with the impacts of artificial influences removed. Artificial influences may include abstractions, discharges, transfers, augmentation and impoundments.</td>
</tr>
<tr>
<td>NCIC</td>
<td>National Climate Information Centre. NCIC area monthly rainfall totals are derived using the Met Office 5 km gridded dataset, which uses rain gauge observations.</td>
</tr>
<tr>
<td>Recharge</td>
<td>The process of increasing the water stored in the saturated zone of an aquifer. Expressed in depth of water (mm).</td>
</tr>
<tr>
<td>Reservoir gross capacity</td>
<td>The total capacity of a reservoir.</td>
</tr>
<tr>
<td>Reservoir live capacity</td>
<td>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 (e.g. storage held back for emergency services, operating agreements or physical restrictions). May also be referred to as ‘net’ or ‘deployable’ capacity.</td>
</tr>
<tr>
<td>Soil moisture deficit (SMD)</td>
<td>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).</td>
</tr>
</tbody>
</table>

## Categories

<table>
<thead>
<tr>
<th>Category</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exceptionally high</td>
<td>Value likely to fall within this band 5% of the time</td>
</tr>
<tr>
<td>Notably high</td>
<td>Value likely to fall within this band 8% of the time</td>
</tr>
<tr>
<td>Above normal</td>
<td>Value likely to fall within this band 15% of the time</td>
</tr>
<tr>
<td>Normal</td>
<td>Value likely to fall within this band 44% of the time</td>
</tr>
<tr>
<td>Below normal</td>
<td>Value likely to fall within this band 15% of the time</td>
</tr>
<tr>
<td>Notably low</td>
<td>Value likely to fall within this band 8% of the time</td>
</tr>
<tr>
<td>Exceptionally low</td>
<td>Value likely to fall within this band 5% of the time</td>
</tr>
</tbody>
</table>