Summary – January 2020

Table 1. North West England summary of the current water situation.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Current status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rainfall</td>
<td>North West England rainfall was 99% of January’s Long Term Average (LTA). Classed as ‘Normal’ this month.</td>
</tr>
<tr>
<td>Soil Moisture Deficit (SMD)</td>
<td>SMD levels remained low across all of North West England during January; with soils at, or close to, full saturation throughout the month.</td>
</tr>
<tr>
<td>River Flows</td>
<td>Classed between ‘Below Normal’ and ‘Normal’.</td>
</tr>
<tr>
<td>Groundwater Levels</td>
<td>Classed between ‘Normal’ and ‘Exceptionally high’.</td>
</tr>
<tr>
<td>Reservoir Storage</td>
<td>Total North West England reservoir storage increased from 90% (end of December) to 93% (end of January).</td>
</tr>
</tbody>
</table>

Rainfall
Rainfall for North West England as a whole was classed as ‘Normal’ for January (99% of the LTA), with all ten hydrological areas observing monthly rainfall totals that were classed as ‘Normal’ (Figure 2). The highest rainfall was observed in the Derwent (125% of January’s LTA), with the lowest rainfall being observed in the Douglas (76% of January’s LTA) (Figure 3). Following some fairly heavy rainfall on 11 January the Met Eireann named Storm Brendan arrived in the North West on 14 January, bringing strong winds and rain; the greater impacts mainly being observed in coastal areas leading to the cancellation of ferry services and causing damage to the roof at Preston train station. The week following the storm was much drier, with scattered rainfall over the final week of the month. Despite the relatively wet first half of the month in many parts, all hydrological areas in the southern half of North West England observed below average monthly totals. The 3 month cumulative rainfall totals were classed as ‘Normal’ and very close to average in nine out of ten hydrological areas, however, the impact of September’s heavy rainfall in 2019, continues to be exhibited in the 12 month cumulative totals, particularly in the Mersey and Irwell, Cheshire Rivers Group and Douglas hydrological areas, which all observed above average rainfall totals over this period which were classed as ‘Exceptionally high’. The 12 month totals for these areas rank as the 3rd, 3rd and 4th wettest respectively in the past 129 years.

Soil Moisture Deficit/Recharge
There was very little change in SMD levels across North West England compared to the end of December; with levels remaining at, or very close to, full saturation throughout the month and were as expected for the time of year (Figure 4).

River Flows
Monthly mean river flows for January fell when compared to December and were generally classed as ‘Normal’; with the exception being in the Mersey catchment where monthly mean flows were classed as ‘Below normal’, but by a fairly small margin (Figure 5). River flows were highest (in terms of percentage of the LTA) in the Eamont catchment (105% of the LTA for January) and lowest in the Mersey (75% of the LTA for January) (Figure 6). Due to the antecedent SMD conditions, several gauging stations in Lancashire recorded large peaks in flow in response to the relatively high rainfall observed on 11 January with Caton (River Lune), Samlesbury (River Ribble) and St Michaels (River Wyre) all recording daily mean flows around Q2 (i.e. these flows have been exceeded for less than 2% of the time at these gauging stations). Ashton Weir (River Mersey) and Ashbrook (River Weaver) gauging stations also recorded large peaks in the days that followed, with daily mean flow around Q3 at both stations on the 12 January and 14 January respectively. Despite these peaks in flow, the month mean for both catchments remained below average for the time of year.

(Summary continued on next page.)
Groundwater Levels
Groundwater levels for January were classed between ‘Normal’ and ‘Exceptionally high’ (Figure 7), with a couple of changes in classification noted since last month. Crow Lady Farm remained classed as ‘Normal’, Skir with as ‘Above normal’ and Priors Heyes and Richmond Park as ‘Exceptionally high’. Bruntwood Hall changed classification, from ‘Above normal’ to ‘Exceptionally high’ and Brown Bank Lay-By from ‘Above normal’ to ‘Notably high’. The levels at Priors Heyes remain high compared to historic levels because the aquifer is recovering from the effects of historically high abstractions.

Reservoir Storage/Water Resource Zone Stocks
Reservoir stocks for North West England increased from 90% at the end of December to 93% by the end of January (Figure 10). By the month end, for a second consecutive month, reservoir stock (in terms of percentage) was highest at Stockport (100%) and lowest at Longdendale (73%). Reservoir stock at Haweswater increased by 11% when compared to the end of December, and was at 96% (Figure 1), with Ennerdale and Crummock both full and spilling. The combined storage at Haweswater and Thirlmere was above average for the time of year (95% compared to an average of 89%) and 13% higher than this time last year. Audenshaw No 1, Heaton Park Open, High Bullough, Hollingworth Lake, Kitcliffe, Rhodeswood, Swinden No 1, Torside and Woodhead were among the reservoirs kept low for maintenance works.

Report continued on next page.
Figure 1: Storage in Haweswater reservoir including the drought triggers for the reservoir and storage for representative years; 1995, 2003, 2010, 2018 and 2019.

Picture 1: River at Coniston ETW Upstream gauging station on 25 January 2020 at 08:45. Photo taken by a member of the Cumbria Hydrometry and Telemetry Team. The flow at this time was 0.34m³/s, which is equivalent to Q52.

Contact: CMBLNC & GMC Hydrology Team
Figure 2. Total rainfall (as a percentage) for hydrological areas across North West England for the current month, the last three months, the last six months, and the last 12 months, classed relative to an analysis of respective historic totals. HadUK data based on the Met Office 1km gridded rainfall dataset derived from rain gauges (Source: Met Office © Crown Copyright 2020). Provisional data based on Environment Agency 1km gridded rainfall dataset derived from Environment Agency intensity rain gauges.
Rainfall

Above average rainfall

Below average rainfall
Rainfall

Above average rainfall

Below average rainfall

Figure 3: Monthly rainfall totals for the past 12 months expressed as a percentage of the long term average (1961-90), for North West England and its hydrological areas using HadUK data based on the Met Office 1km gridded rainfall dataset derived from rain gauges (Source: Met Office © Crown Copyright 2020). Provisional data based on Environment Agency 1km gridded rainfall dataset derived from Environment Agency intensity rain gauges.
Figure 4: Soil moisture deficits for weeks ending 31 December 2019 (left panel) and 28 January 2020 (right panel). Top row shows actual soil moisture deficits (mm) and bottom row shows the difference (mm) of the actual from the 1961-90 long term average soil moisture deficits. MORECS data for real land use (Source: Met Office © Crown Copyright, 2020).
Figure 5: Monthly mean river flow for this month, expressed as a percentage of the month’s long term average and classed relative to analysis of historic monthly means (Source: Environment Agency).
River Flow

Ashbrook, WEAVER (NW)
Ranking derived from data for the period Dec-1977 to Dec-2017

Ashton Weir, MERSEY
Ranking derived from data for the period May-1976 to Dec-2017

Caton, LUNE
Ranking derived from data for the period Jan-1959 to Dec-2017

Newby Bridge FMS, LEVEN (NW)
Ranking derived from data for the period Jan-1972 to Dec-2017

Seaton Mill, DERWENT (NW)
Ranking derived from data for the period Sep-1960 to Dec-2017

Pooley Bridge Upstream, EAMONT
Ranking derived from data for the period Jul-1970 to Dec-2017
River Flow

- Exceptionally high
- Notably high
- Above normal
- Normal
- Below normal
- Notably low
- Exceptionally low
- Latest data

**Figure 6**: Monthly mean river flows for the past 10 months for sites across North West England (*Source: Environment Agency*). Flow for Seaton Mill has been estimated due to uncertainty in the current rating.
Groundwater Levels

Figure 7: Groundwater levels at the end of the month classed relative to an analysis of historic groundwater levels for the same month (Source: Environment Agency). Geological map reproduced with kind permission from the UK Groundwater Forum, British Geological Survey (BGS) © Natural Environment Research Council (NERC).
Groundwater Levels

Figure 8: End of month groundwater levels for the past 34 months for North West England groundwater sites (Source: Environment Agency).
Figure 9: The location of reservoirs that comprise the supply districts across North West England and selected individual reservoirs.
Reservoir Stocks

- Total North West England Reservoir Stocks
- North Area Supply District: Ribble
- North Area Supply District: Lakes
- Pennines Combined
- Peak Supply District: Longdendale
- Peak Supply District: Stockport
- Rivington Group
- Haweswater Reservoir
Reservoir Stocks

Figure 10: End of month reservoir stocks for supply districts across North West England and selected individual reservoirs for current and representative years; 1995, 2003, 2010, 2018 and 2019 (Source: United Utilities and Environment Agency).
### Glossary

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
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<tbody>
<tr>
<td>Aquifer</td>
<td>A geological formation able to store and transmit water.</td>
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<tr>
<td>Areal average rainfall</td>
<td>The estimated average depth of rainfall over a defined area. Expessed in depth of water (mm).</td>
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<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>Effective rainfall</td>
<td>The rainfall available to percolate into the soil or produce river flow. Expessed 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>MORECS</td>
<td>Met Office Rainfall and Evaporation Calculation System. This is a generic name for Met. Office services involving the routine calculation of soil moisture and evaporation for Great Britain and uses a grid of 40 x 40 km squares.</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>HadUK</td>
<td>HadUK area monthly rainfall totals are derived using the Met Office 1 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. Expessed 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 reservoir capacity normally usable for storage to meet established reservoir operating requirements.</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 that the soil can hold. Expessed in depth of water (mm).</td>
</tr>
</tbody>
</table>

### Categories for rainfall, river flows, groundwater levels

- **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

### Units

- **mAOD**: Metres Above Ordnance Datum (mean sea level at Newlyn Cornwall).
- **mBTWL**: meters Below Top Water Level

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