

## Report to Gouthwaite Board of Management Hydrological Conditions of the Nidd Catchment – 2019 to April 2020

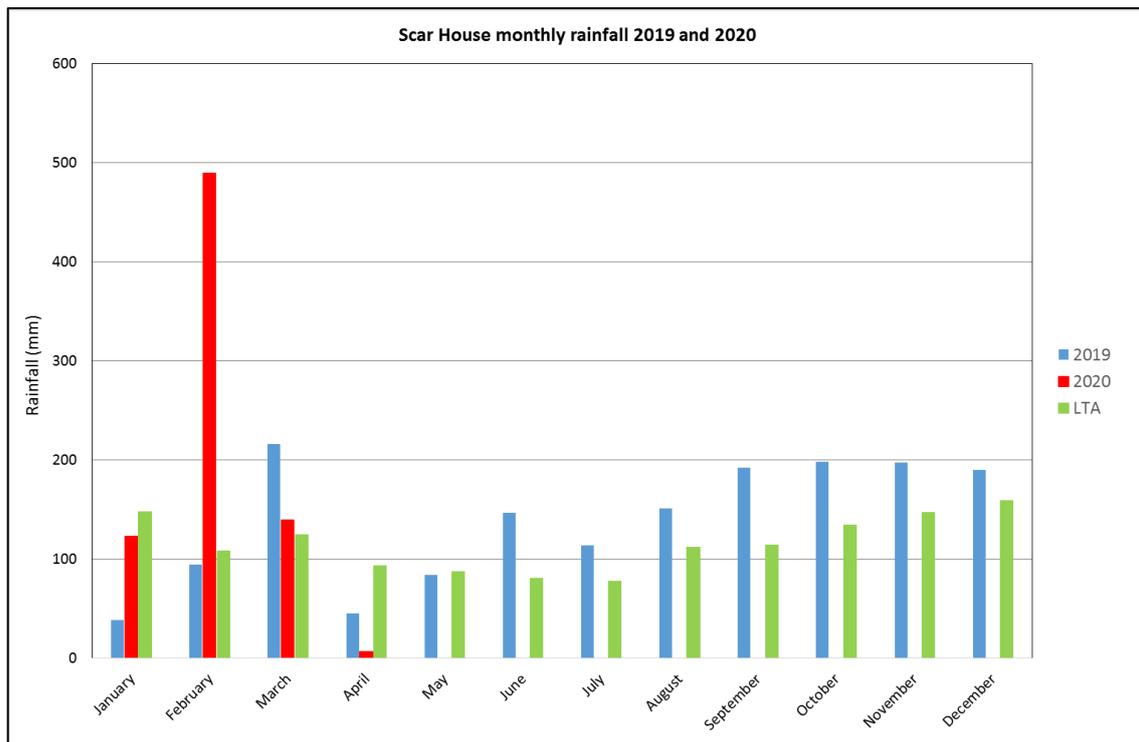
### Rainfall

Graph 1 below shows the monthly rainfall totals recorded in the Upper Nidd catchment at Scar House Reservoir rain gauge during 2019 and 2020 to date. All recorded rainfall is compared to the calculated Long Term Average totals (LTA).

Total rainfall for 2019 at Scar House was 120% of the LTA. The period January to May included four months of below average rainfall, with the exception being March. 173% of the monthly LTA fell in a series of frontal weather events in the first half of that month, before dry conditions returned. For the Nidd catchment as a whole, the year to April 2019 was the 7<sup>th</sup> driest 12 month period to April in the record since 1891 (from Met Office Had-UK data set).

A significant turnaround in conditions occurred from June to December 2019, which were notably wet months, all recording above LTA rainfall at Scar House. Between late September and 24<sup>th</sup> December rainfall was persistent, with only brief drier spells. For the Nidd catchment as a whole, 2019 held the 4<sup>th</sup> wettest 7-month period across June to December since 1891 (exceeded by 2012, 2000 and 1954).

January 2020 was drier, but a series of storms in February contributed to a very high monthly total of 452% of the LTA at Scar House\*, and the wettest February on record for the Nidd catchment as a whole (since 1891). March received a little below average rainfall and April has been very dry to date, with only 7% of the LTA recorded by the 23<sup>rd</sup> of the month.



**Graph 1: Monthly rainfall totals at Scar House Reservoir compared to the LTA for 2019/20**

#### Footnote:

\* As in previous years, the rainfall data used in this report has been recorded by the tipping bucket rain gauge (TBR) at Scar House. In both January and February 2020 the TBR monthly totals were 16% greater than those recorded by the monthly storage gauge. Discrepancies may be due to the effects of snowfall on gauge accuracy, or the potential for TBRs to over-record during very heavy rainfall. The very high % LTA value for February 2020 rainfall should be viewed with some caution, but even with the storage gauge data the value would be 376% of the LTA.

## Hydrology

Report to Gouthwaite Board of Management – Hydrological Conditions of the Nidd Catchment – April 2020

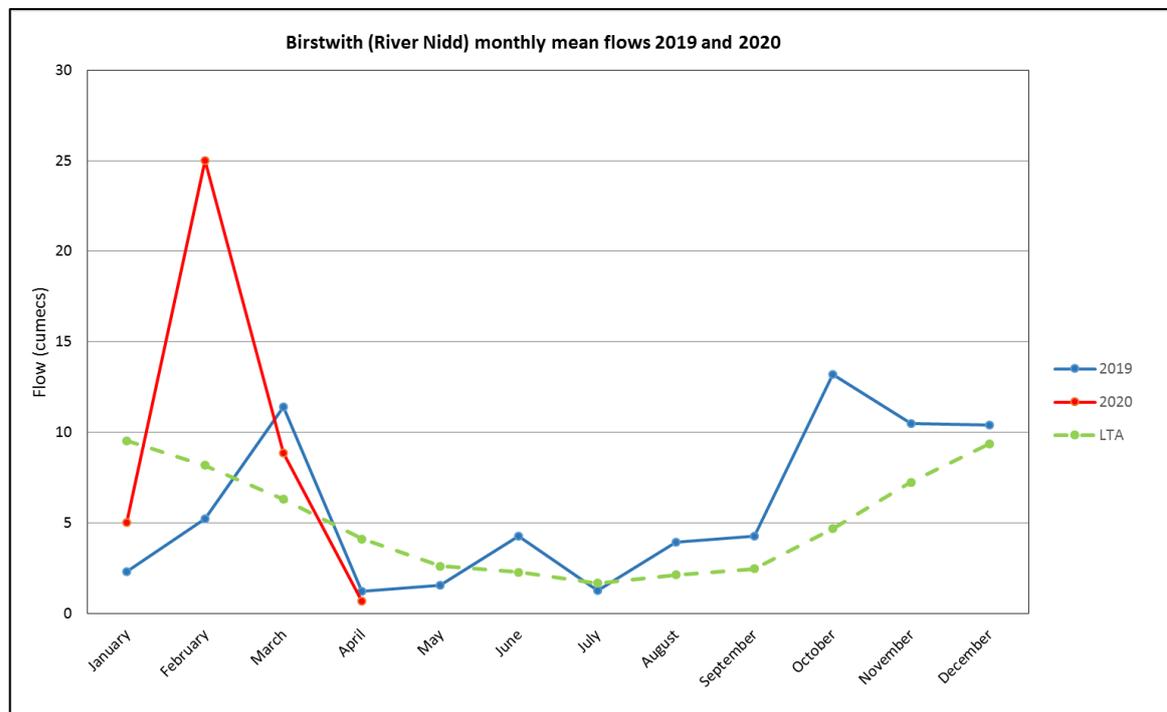
### River Flow

Graph 2 shows the monthly mean flows recorded at Birstwith flow gauge (River Nidd) during 2019 and early 2020. They are compared to the calculated LTA.

Reflecting the rainfall pattern, 2019 began with flows significantly below the LTA in January through to February and in April through to May. In March, high flows in the second and third weeks of the month produced monthly mean flows well above the LTA.

During the summer the overall trend was for short-term responses to rainfall, providing higher flows in June and August and low flows in July when reservoir levels fell. The River Nidd flows were actually low for the first three weeks of September, but a high flow peak in the last two days took the monthly mean flow above the LTA.

An overall pattern of sustained high flows above the monthly LTAs was recorded during October, November and much of December 2019.



**Graph 2: Monthly mean flow at Birstwith (River Nidd) compared to the LTA for 2019 & 2020**

In 2020, low flows in January were followed by exceptionally high flows responding to February's series of storms, with the February monthly mean flow at Birstwith representing over 300% of the LTA. Flows remained elevated in March, declining during the last week. Mean flows in April 2020 to date are around 17% of the LTA, reflecting very low rainfall.

### Reservoir Level

Graph 3 overleaf shows the reservoir level at Gouthwaite during 2019 and 2020 relative to the spill level of 11.89m. For the first nine months of 2019, reservoir levels fluctuated in response to rainfall and through application of the control rules, rather than showing prolonged trends. The reservoir levels rose above the spill level briefly in February and for a little longer in March, before declining through April and early May. The Environment Agency level gauge malfunctioned during late April to early June and this period of data has been estimated by correlation with Yorkshire Water's level gauge. There was a brief period of overspill in June. In late July and late September reservoir levels fell to approximately 70% of full capacity.

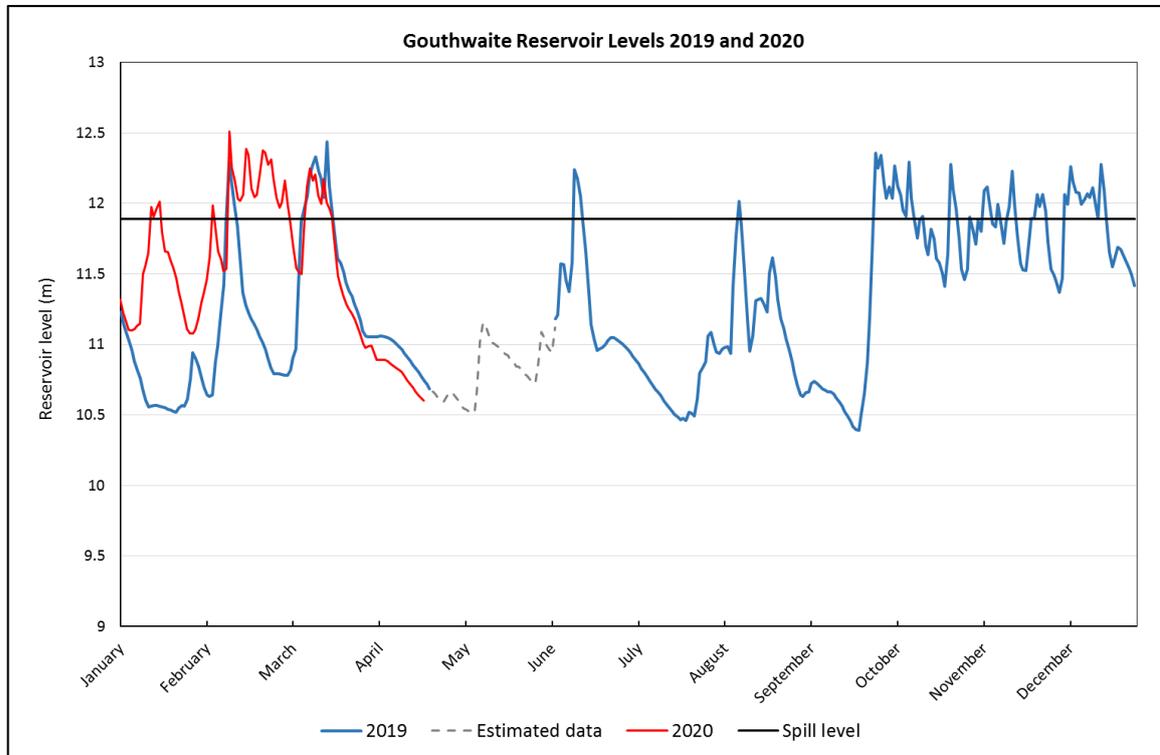
Reservoir levels rose sharply as September turned to October and during the wet autumn there were frequent spills, occurring on over 40 days from October through to December. Reservoir levels were lower for much of January 2020 but rose above the spill level again for most of the very wet February and the first half of March. Reservoir levels have since declined and at the

**Hydrology**

 Report to Gouthwaite Board of Management – Hydrological Conditions of the Nidd Catchment – April 2020
 

---

time of writing on 23<sup>rd</sup> April 2020 are at 73% of full capacity, 0.6m below the average level expected for the time of year.



**Graph 3: Gouthwaite Reservoir levels 2019 to 2020**

**Compensation Releases**

Graphs 4 and 5 overleaf show the reservoir release flows, including any spill, for 2019 and 2020 together with the required compensation releases under the current control rules.

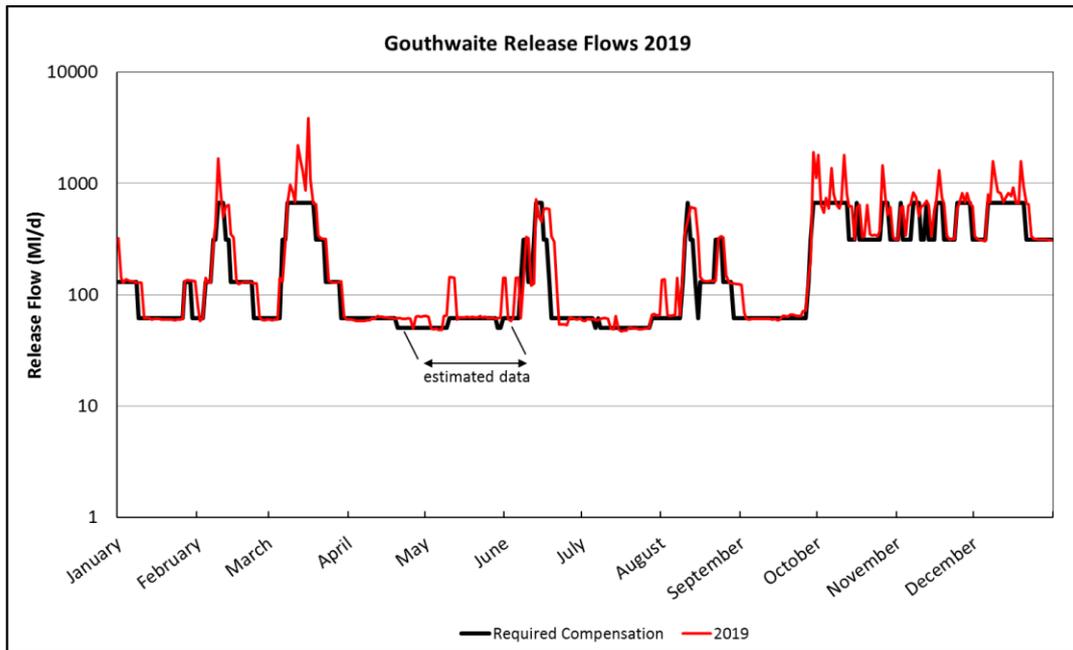
Throughout 2019 and in 2020 to date the release flows have closely followed the required compensation rates. Just a few days lag is observed on occasion between compensation requirements decreasing with reservoir level and actual releases being stepped down, for example in June to early September 2019.

During the wet autumn of 2019, flows alternated between over spills and the 314 MI/d release requirements for the first control rule band below spill level.

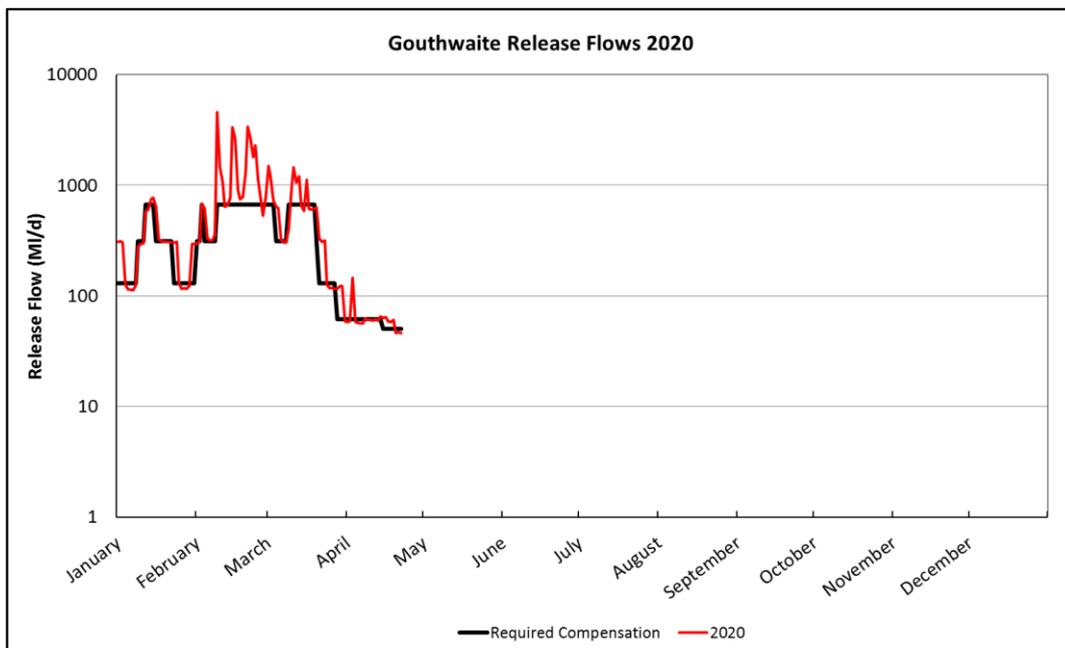
In 2020 further spills occurred during the very wet February and in early March when reservoir levels remained high, but releases continued to be restricted to the minimum requirements.

**Hydrology**

Report to Gouthwaite Board of Management – Hydrological Conditions of the Nidd Catchment – April 2020



**Graph 4: Compensation releases 2019**



**Graph 5: Compensation releases 2020**