KFAG 12/11/2019 (AIC)

Response to the Derwent and Don November flood events

Preliminary desk top examination of the events and the circumstances leading up to the flood events on the Don and Derwent (Derbyshire) river systems.

From previous experience of the flooding events within the West Cumbria catchment and, specifically, above the town of Keswick, Cumbria there is significant evidence of increased flood risk to the town and the surrounding environment if the Thirlmere reservoir upstream of Keswick is FULL, or thereabout, at the point of arrival of a storm event. Specifically, for Keswick 1995, 2005, 2009, 2015 are the recent flood events where the Thirlmere reservoir has been full.

Consideration of the Don and Derwent (Derbyshire- Dr) events of 2019

Looking at the Environment Agency (EA) water situations reports for October 2019 for the Midlands and Yorkshire :-

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/845832/Water_Sit_Midlands_Oct_19.pdf

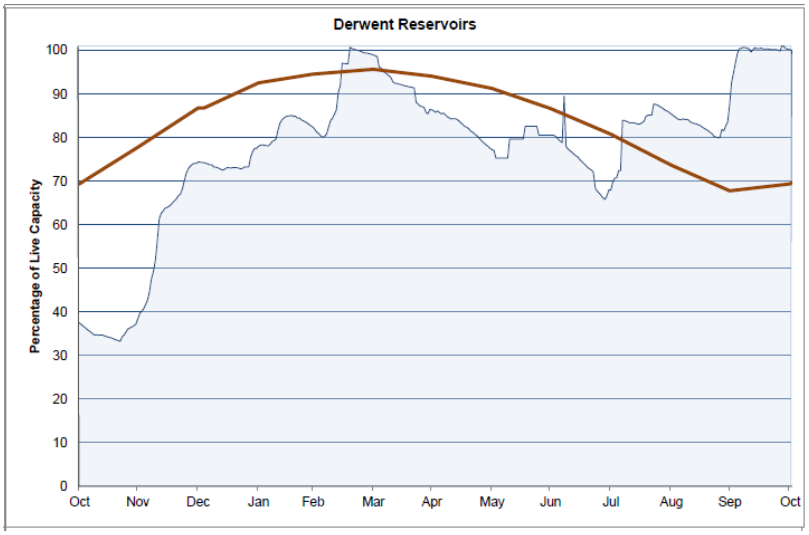
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/845825/Yorkshire_Water_Situation_Report_October_2019.pdf

From the Midlands report we read :-

Summary – October 2019
Rainfall – West Midlands received 200% of the Long Term Average (LTA) rainfall and East Midlands received 180% of the LTA rainfall.
Soil Moisture Deficit – Soils across West and East Midlands are wetter than expected for the time of year.
River Flows – All river flows sites are reporting Exceptionally High monthly average flows.
Groundwater Levels – Most groundwater sites are showing an increase in level.
Reservoir Storage – All reservoirs are healthy for the time of year and above the LTA.

Reservoir Storage
All reservoirs are healthy and above their expected Long Term Average for October. **Tittesworth, Blithfield, Derwent and Vyrnwy are full.** (Nb. Derwent / Ladybower Reservoir is at the head of the Derwent River).

Derwent reservoir status for 2019 – red line is the LTA (long term average) shaded blue the reservoir water level.



Looking at the Derwent River below the Derwent Reservoirs:-

GOV.UK Flood information service

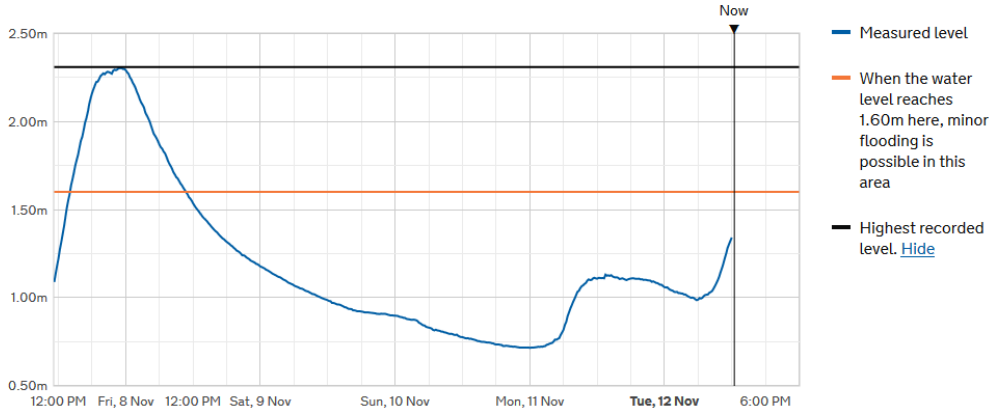
River level

River Derwent at Yorkshire Bridge

Check for flood warnings in this area

Latest recorded level **1.34m** at **12:00pm Tuesday 12 November 2019**.

River levels at this location in the last 5 days



We can see that the Derwent reservoir was spilling for the rainfall event of Friday the 8th November and at peak was spilling at the highest recorded level.

Given the status of the ground soils with the Soils Moisture Deficit being mostly less than 10mm at the end of October 2019 and the Reservoir situation as FULL it can be reasonably expected that any further rainfall events in the following month would produce additional excessive flows.

<u>Looking at the Yorkshire Water Situation Report – relevant to the Don River</u>

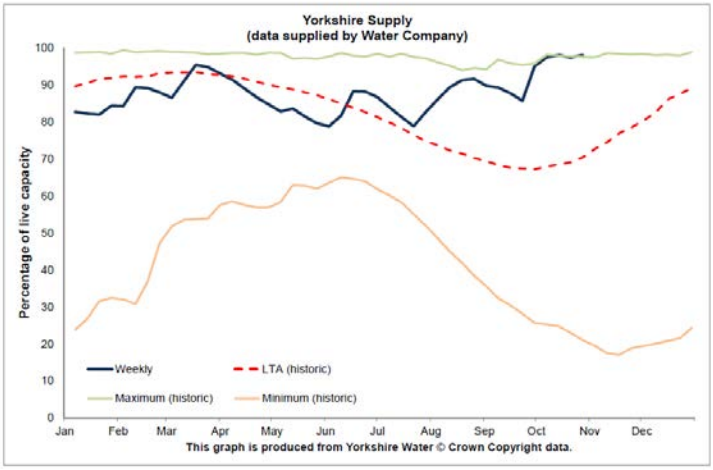
We read similar comments about the soils moisture content – i.e. the soils are at or near to saturated.

The comment on the reservoir stocks:-

Reservoir Storage

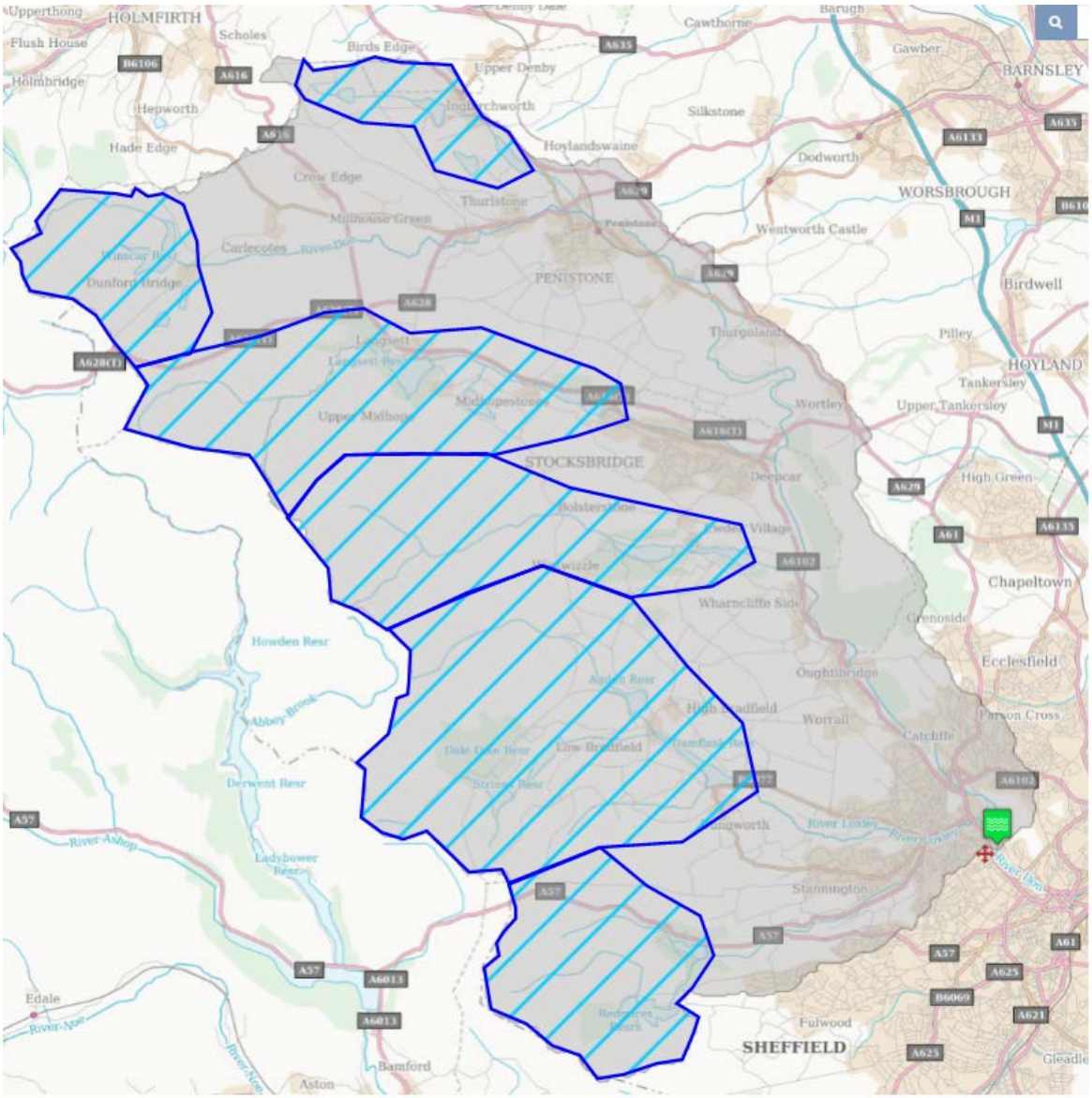
Reservoir stocks were at almost full capacity; they increased slightly during the first half of the month and remained essentially steady thereafter. Overall reservoir stocks were well above the LTA and equal to the historic maximum for the time of year (based on records from 1990).

Reservoir Stocks – Data from Water Company



From Gaugemap – copyright Shoothill records the following river gauges were showing that the reservoirs above the gauge stations were as follows:-
Penistone has been spilling since 24th September
Bower Hill Bridge has been spilling since 24th September
Wharncliffe Side has been spilling since 17th September
Loxley Rowell Bridge has been spilling since 24th September
Sheffield Oakbrook Road has been spilling since 24th September
Sheffield Centenary Works has been spilling since 24th September
When this evidence is compared to the river flows on the 7th and 8th November ALL the river flows have immediately responded to the rainfall, with no assistance from storage capacity at the reservoirs, leading to the peak flows hitting the Don through Sheffield and beyond at much the same time; a delay in individual peak flows would be evident if there was storage at the reservoirs.

Without further research it appears that the situation below Sheffield, i.e. at Doncaster and beyond is a consequence of the Don being over-charged and spilling out onto the floodplains and low-lying areas possibly below the levies that control the lower Don. We would need more understanding to be able comment further.



Reservoir Storage Comment

With both the Derwent and Don headwater storage reservoirs they are all well above the seasonal reservoir stock variation and have been for some time this autumn. Reservoirs stocks are required to be near 100% by the end of March. The reservoir operators sit pretty with full barns, whilst the downstream communities suffer wet feet and misery as a consequence that no one can see or apply the logic of reservoir storm storage, it's cheap and very effective but just needs the will and the drivers to achieve progress. Climate Change Risk Assessments 2017 (UK Gov) suggest that action will be required in the future; wake up the future is NOW.

From the work carried out in Cumbria by KFAG we understand the relationship of having full reservoirs early in the Autumn / Winter season and the likelihood of excessive flows – FLOODs – associated with additional rainfall. We have a tentative agreement with the local reservoir operator United Utilities (UU) to attempt to provide reservoir storage capacity, albeit the current system has design and operational inadequacies, the system is work in progress and has taken far too long for a pragmatic approach to be in place. **To formalise these practices more widely to the wider reservoir / catchment system there is a requirement for statutory legislation change.**

The water companies governing body OFWAT has recently being looking at resilience of the water sector operation. It recognises that it is not just resilience of supply but also must account for resilience to the environment and to communities. As further evidence of a requirement for legislative change we would emphasise that available knowledge of the "Water Situations Reports – EA" together with recognising that reservoirs stocks are well ahead of the seasonal average is sufficient evidence to move towards a managed reservoir situation. With application of managed winter reservoir levels the system could also then provide resilience to both the environment and local – flooded – populations.

Resilience report :
https://www.ofwat.gov.uk/wp-content/uploads/2017/09/Resilience-in-the-Round-report.pdf