



# Daglingworth Stream & Gumstool Brook Flow Update

24 November 2020

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# Monitoring Daglingworth Stream & Gumstool Brook

## Key Updates

- Daglingworth Stream dried up in Stratton in the summer & autumn of 2020, with low flow in the Gumstool Brook, similar to 2018.
- The Daglingworth Stream dried up between Daglingworth & Stratton, close to Wellhill Copse.
- The reaching drying up is upstream of the Stratton flood relief channel, confirming previous EA feedback that this appears not to be causing low flows in the Daglingworth Stream.
- Barton Lane allotments borehole monitoring has continued. The 2<sup>nd</sup> full year of groundwater level data has shown similar trends in 2018/19 and 2019/20, further improving insight.

# Monitoring Daglingworth Stream & Gumstool Brook

## Monitoring Summary

- Regular stream flow observations continue to be recorded by local volunteers, providing a fuller picture of river flows.
- Groundwater levels continue to be recorded by volunteers in Cirencester.
- Data & photographic record continues to be collated on the Friends of Gumstool Brook web site [www.gumstool.org.uk](http://www.gumstool.org.uk).
- The Daglingworth Stream & Gumstool Brook have dried up in Cirencester in the autumns of 2014, 2015, 2016, 2017(*uncertain as no data*), 2018 and 2020. Only in 2019 have these streams continued to flow.
- Daglingworth Stream in south Stratton was recorded as showing no flow in autumn 2018. This was the first time in the record that started in 2014, but has been recorded as having no flow in summer & autumn 2020.
- Extent of drying of Daglingworth Stream in 2020 recorded as affecting a long length of river than previously noted, ranging from 750 metres, possibly up to 1.5 km.
- More detailed, continuous records of flow observations will enable analysis of the influences on the Daglingworth Stream and & the Gumstool Brook.

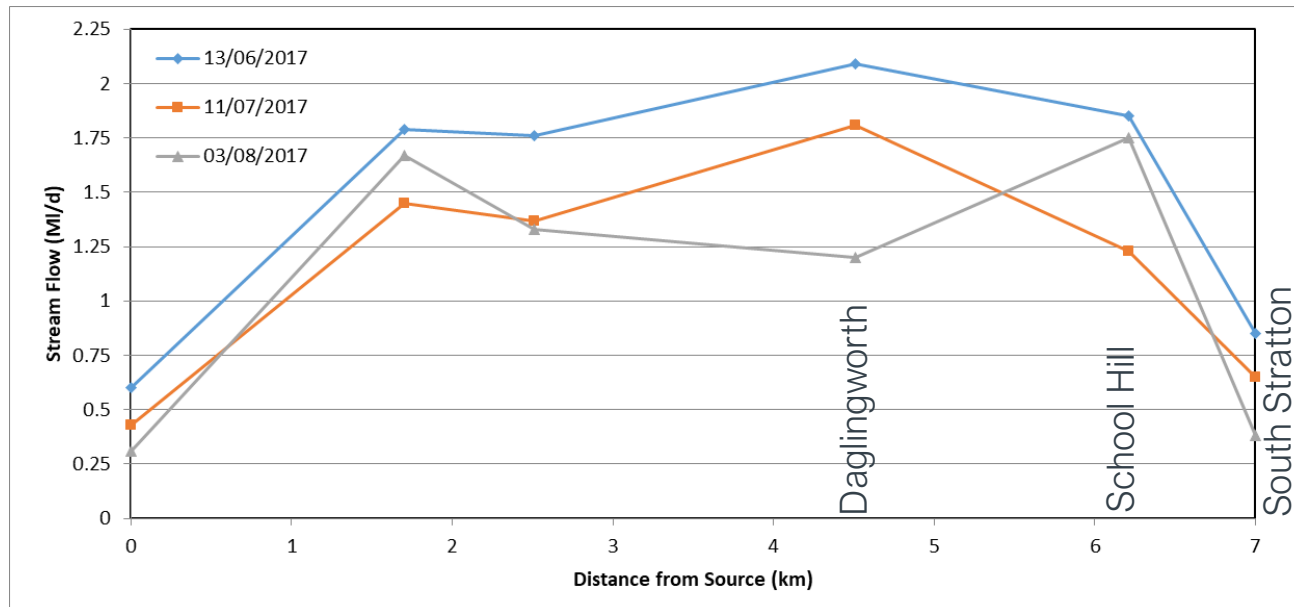
# Flow signature of the Daglingworth Stream

“Citizens doing science”

	Date of observation	Dbourne Abbots - Yew Tree	Dbourne Leer	Middle Dbourne	Dbourne Rouse	Dworth	Lower End Dovecote	Stratton School Hill	South Stratton	Barton Lane Ciren	Gumstool Brook offtake	Gloucester St Bridge	Mill Stream	Mill Pond Overflow	
		1	2	3	4	5	6	7	8	9	10	11	12 & 13	14	
18	a	30/01/18	ponded	flowing	flowing	flowing	flowing	flowing	flowing	flowing	flowing	flowing	flowing	flowing	
	b	13/03/18	mud	flowing	flowing	flowing	flowing	flowing	flowing	flowing	flowing	flowing	No visit	No visit	No visit
	c	23/04/18	Dry	flowing	flowing	flowing	flowing	flowing	flowing	flowing	flowing	flowing	No visit	No visit	No visit
	d	23/05/18	Dry	flowing	flowing	flowing	flowing	flowing	flowing	flowing	flowing	flowing	No visit	No visit	No visit
	e	19/06/18	Dry	flowing	flowing	flowing	flowing	flowing	flowing	flowing	slow flow	v slow flow	flowing	flowing	flowing
		13/07/18	No visit	No visit	No visit	No visit	No visit	No visit	No visit	Slow flow	v slow flow	dry	flowing	flowing	Slow flow
	f	21/07/18	Dry	flowing	flowing	flowing	flowing	flowing	flowing	v slow flow	v slow flow	dry	slow flow	slow flow	Little flow
	g	28/08/18	Dry	flowing	flowing	flowing	flowing	flowing	flowing	v slow flow	no flow	dry	no flow	no flow	no flow
	h	25/09/18	Dry	flowing	flowing	flowing	flowing	flowing	flowing	dry	dry	dry	v slow flow	v slow flow	no flow
	i	02/11/18	Dry	flowing	Flowing	flowing	flowing	flowing	No flow	dry	dry	dry	slow flow	slow flow	slow flow
	j	04/12/18	Dry	Flowing	Flowing	Flowing	Flowing	Flowing	Slow flow	dry	dry	dry	flowing	flowing	flowing
k	07/12/18	No visit	No visit	No visit	No visit	No visit	No visit	No visit	flowing	flowing	flowing	flowing	flowing	flowing	
19	l	21/01/19	Dry	flowing	flowing	flowing	flowing	flowing	slow flow	flowing	flowing	flowing	flowing	flowing	
	m	15/03/19	Dry	flowing	flowing	flowing	flowing	flowing	flowing	flowing	flowing	flowing	flowing	flowing	
	n	01/05/19	Dry	flowing	flowing	flowing	flowing	flowing	flowing	flowing	flowing	flowing	flowing	slow flow	flowing
	o	10/06/19	Dry	flowing	flowing	flowing	flowing	flowing	flowing	flowing	slow flow	slow flow	flowing	slow flow	slow flow
	p	17/07/19	Dry	flowing	flowing	flowing	flowing	flowing	flowing	slow flow	flowing	flowing	flowing	slow flow	flowing
	q	08/08/19	Dry	flowing	flowing	flowing	flowing	flowing	flowing	slow flow	flowing	flowing	flowing	slow flow	flowing
	r	18/09/19	Dry	flowing	flowing	flowing	flowing	flowing	flowing	Slow flow	flowing	flowing	flowing	Slow flow	flowing
	s	24/10/19	Dry	flowing	flowing	flowing	flowing	flowing	flowing	flowing	flowing	flowing	flowing	flowing	flowing
	t	17/11/19	ponded	flowing	flowing	flowing	flowing	flowing	flowing	flowing	flowing	flowing	flowing	flowing	flowing
	u	18/12/19	ponded	flowing	flowing	flowing	flowing	flowing	flowing	flowing	flowing	flowing	flowing	flowing	flowing
20	a	28/01/20	mud	flowing	flowing	flowing	flowing	flowing	flowing	flowing	flowing	flowing	flowing	flowing	flowing
	b	20,21/02/20	flowing	flowing	flowing	flowing	flowing	flowing	flowing	flowing	overflowing	flowing	flowing	flowing	overflowing
	c	15/05/20	Dry	flowing	flowing	flowing	flowing	flowing	slow flow	flowing	flowing	flowing	flowing	slow flow	flowing
	d	12/06/20	Dry	flowing	flowing	flowing	flowing	flowing	Slow flow	No flow	slow flow	slow flow	flowing	Slow flow	no flow
	e	17/07/20	Dry	flowing	flowing	flowing	flowing	flowing	dry	No flow	slow flow	slow flow	slow flow	slow flow	slow flow
	f	31/08/20	Dry	flowing	flowing	flowing	flowing	flowing	dry	No flow	slow flow	v slow flow	slow flow	slow flow	slow flow
	g	11/10/20	Dry	flowing	flowing	flowing	flowing	flowing	dry	No flow	flowing	slow flow	flowing	filling	filling

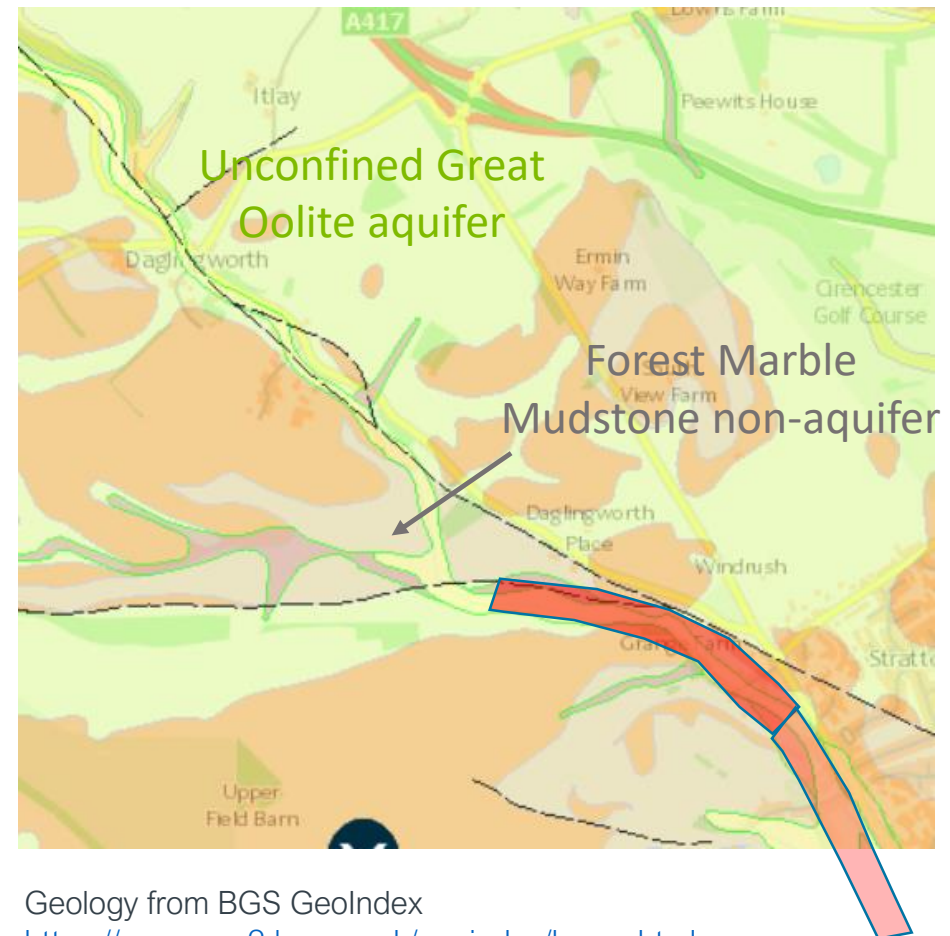
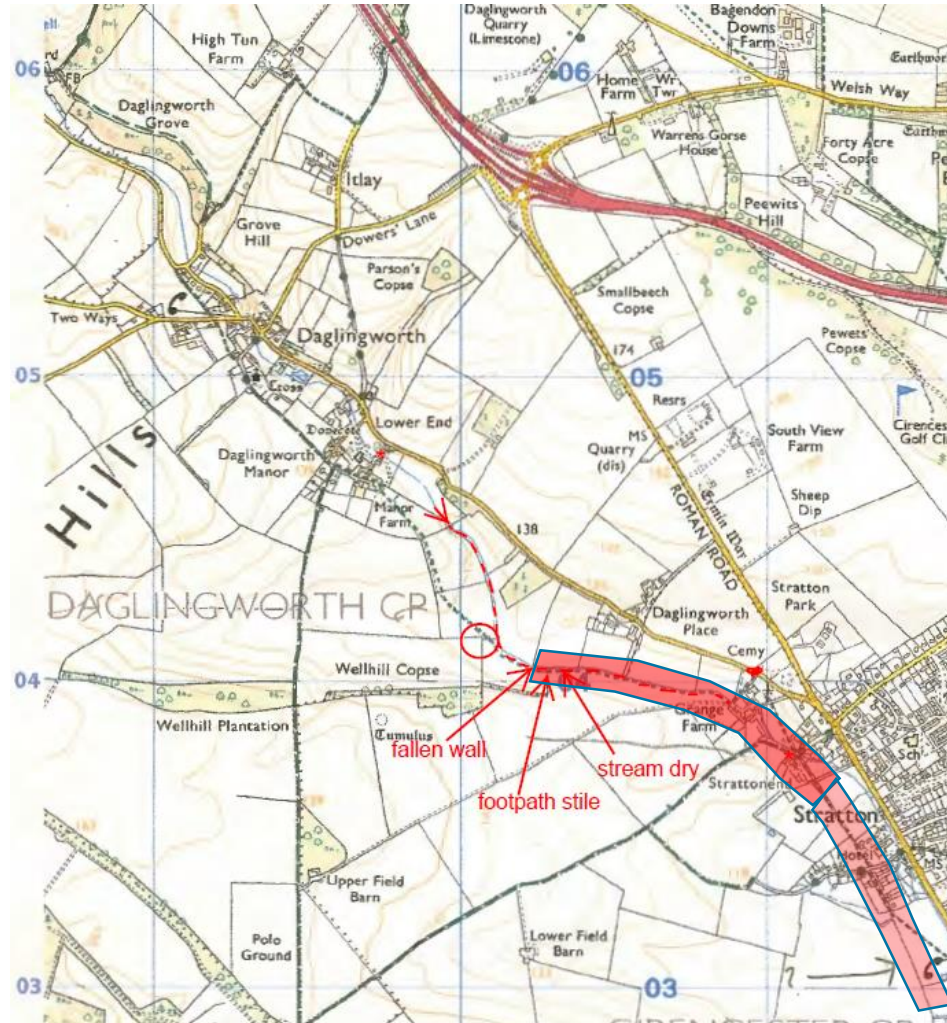
# Daglingworth Stream

- Daglingworth Stream recorded as having no flow in summer & autumn 2020
- Extent of drying recorded as affecting a river reach around 750 m long between Daglingworth & Stratton, starting close to Wellhill Copse, perhaps extend to south Stratton, a reach of 1.5 km long.
- Similar reductions in flow in this area have been measured previously



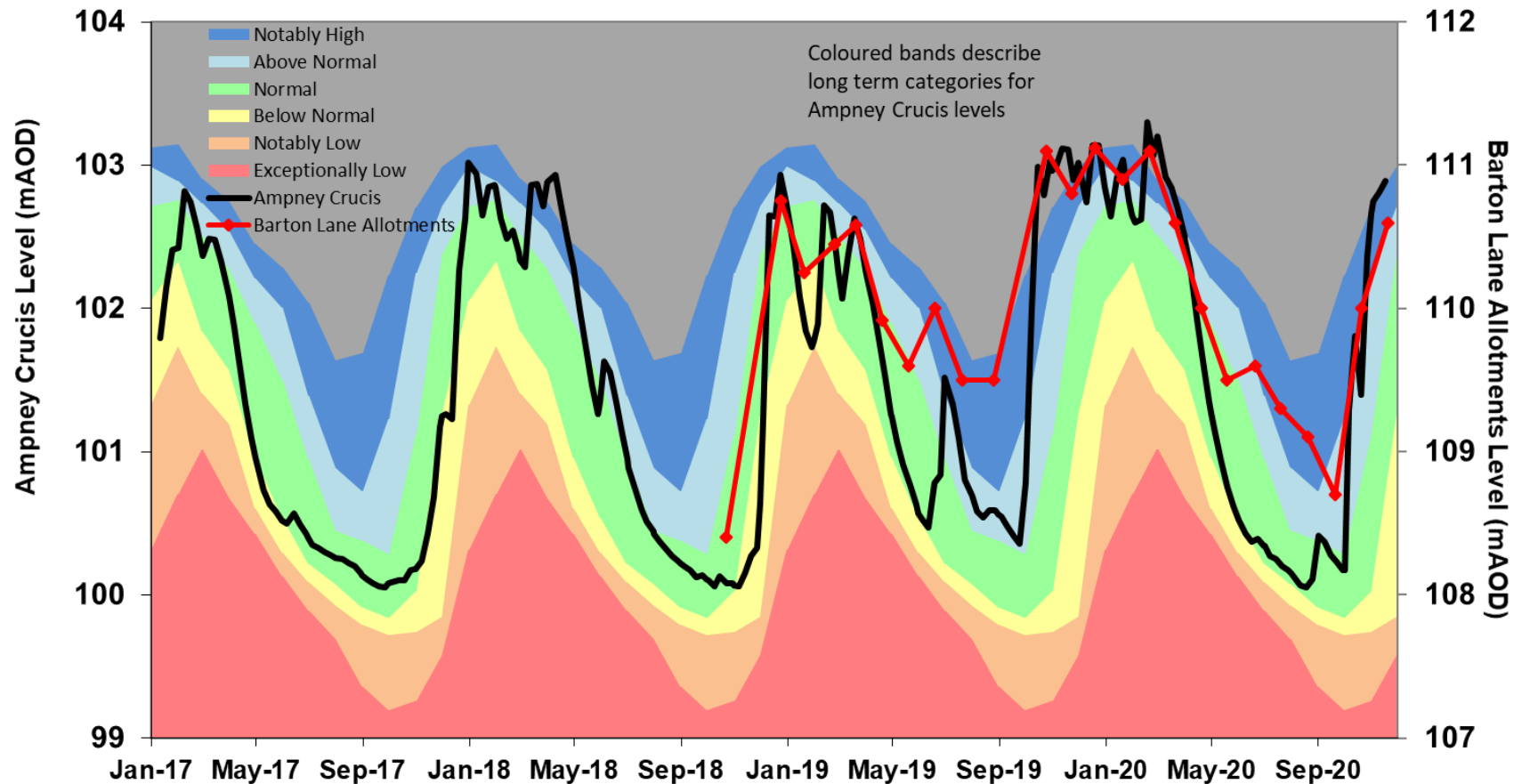
# Daglingworth Stream – Influences on stream drying

- Bedrock geology may influence where water can leak naturally out of the river bed
- Between Daglingworth & Stratton the stream passes from a non-aquifer on to the Great Oolite aquifer



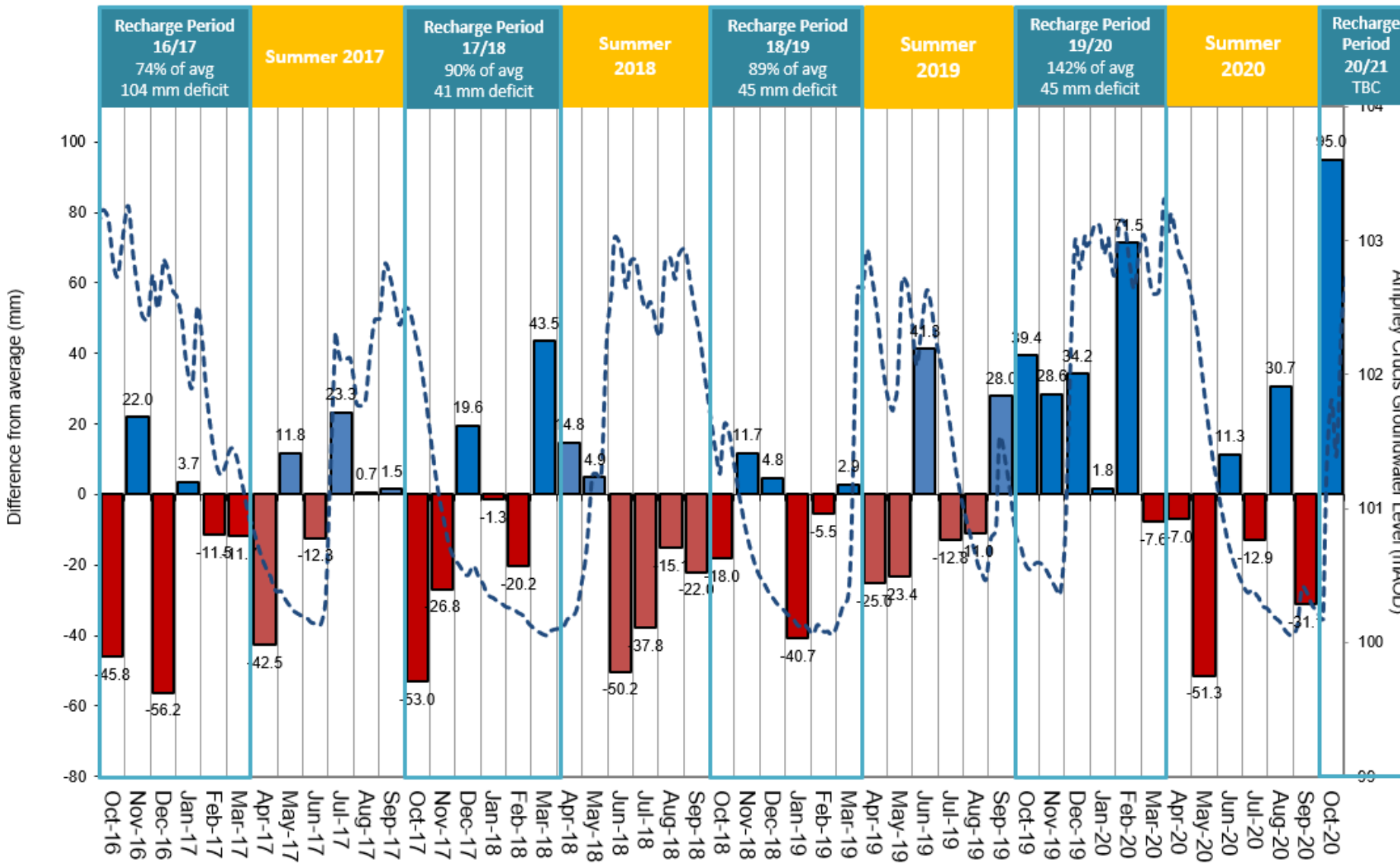
Geology from BGS GeoIndex  
<https://mapapps2.bgs.ac.uk/geoindex/home.html>

# Deep Great Oolite & shallow Gravel groundwater



- Groundwater levels in the Great Oolite & Gravel aquifers show similar patterns in 2018/19 & 2019/20.
- Levels in both aquifers were higher in the summer & early autumn of 2019.
- Higher groundwater levels supported flow in Daglingworth Stream & Gumstool Brook in 2019.

# Rainfall, aquifer recharge & groundwater levels

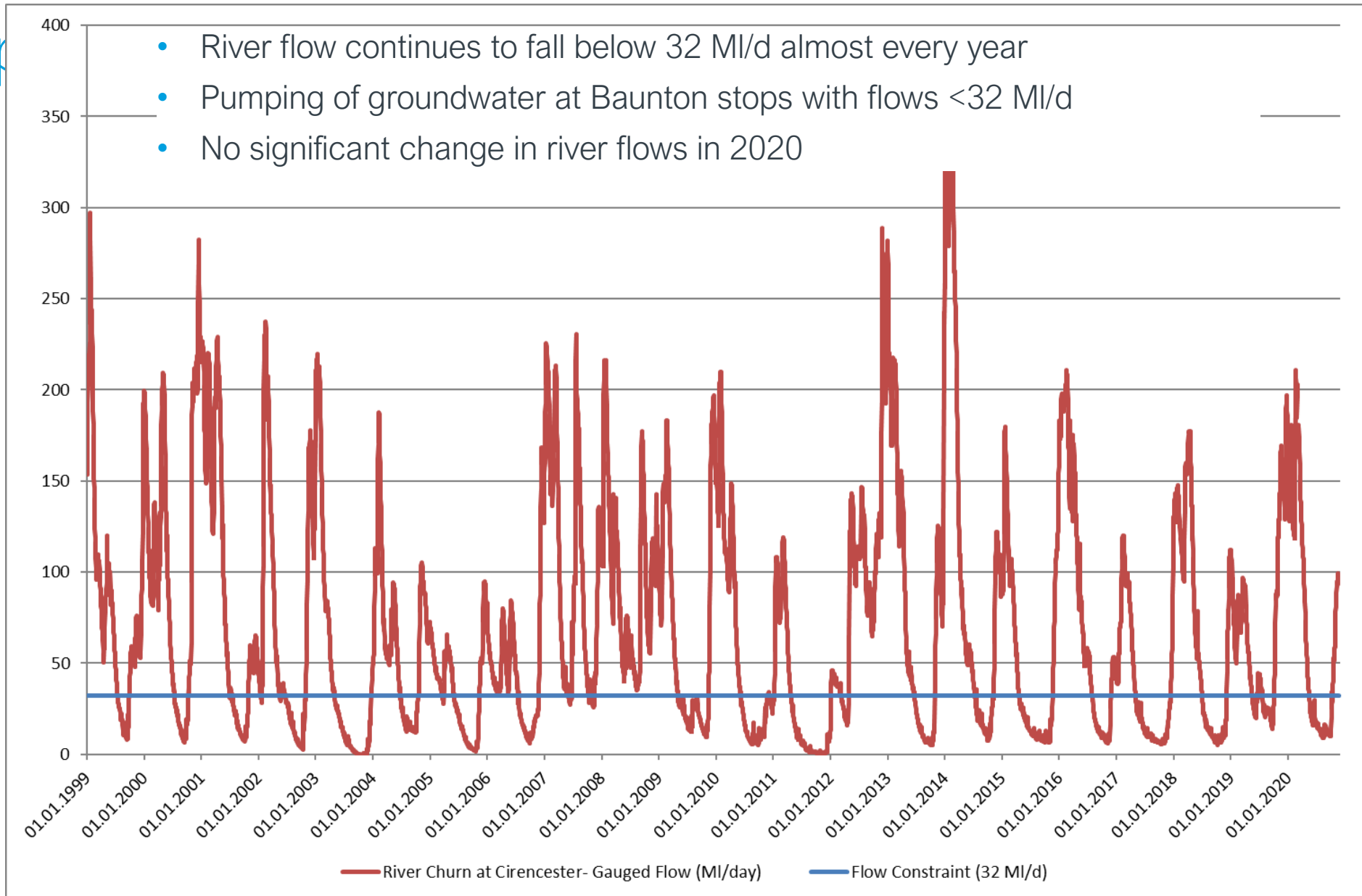


- Groundwater level rises influenced by rainfall during autumn & winter recharge periods.
- Above average rainfall in 2019/20 produced highest groundwater since 2016, but hot, dry spring in 2020 resulted in lower levels.
- Extremely wet October 2020 has resulted in exceptionally high groundwater levels in the Cotswolds.
- Groundwater in other parts of Thames catchment are mostly normal for the time of year.

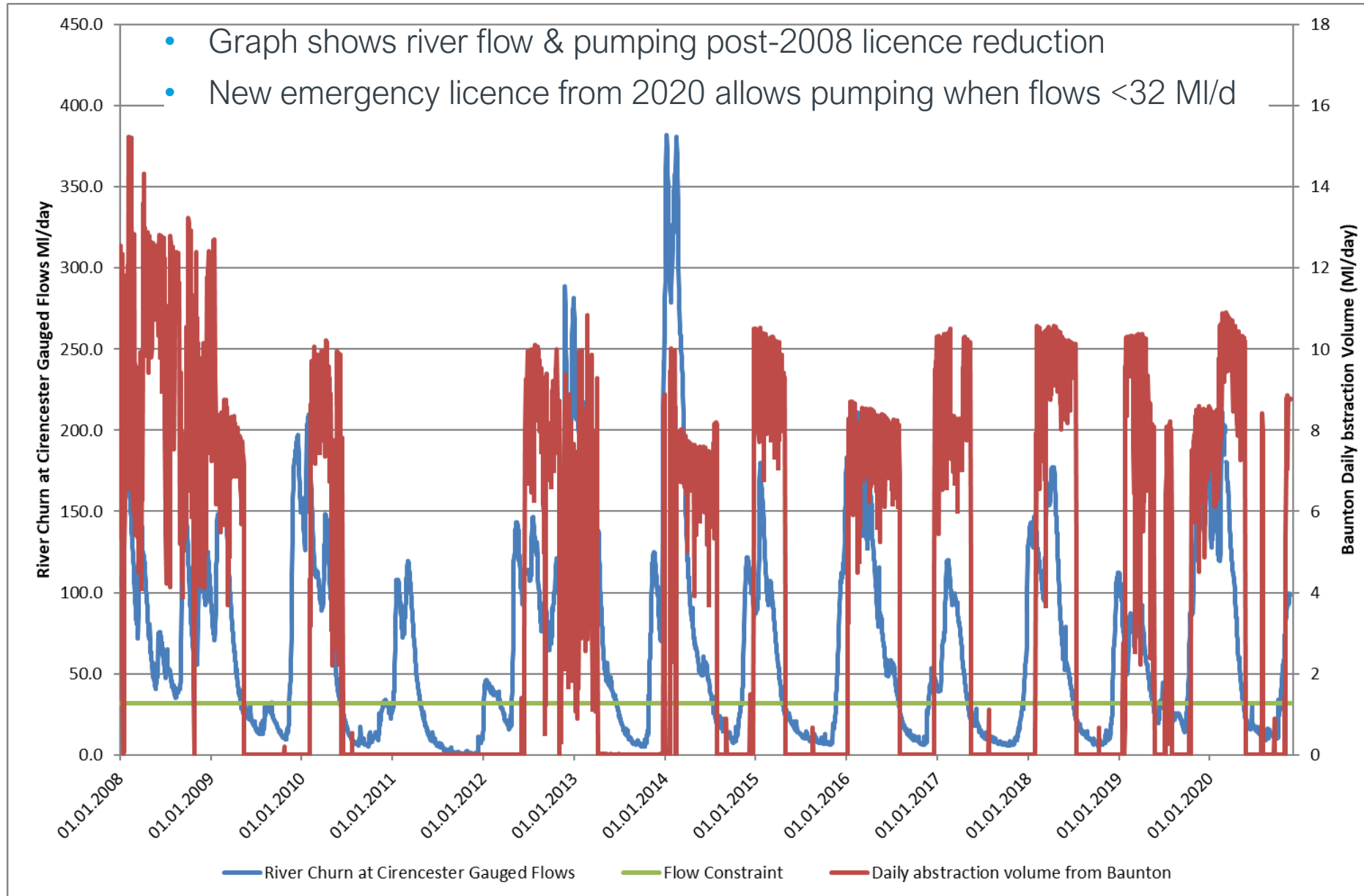


# Flow in River Churn & abstraction flow constraint

Op



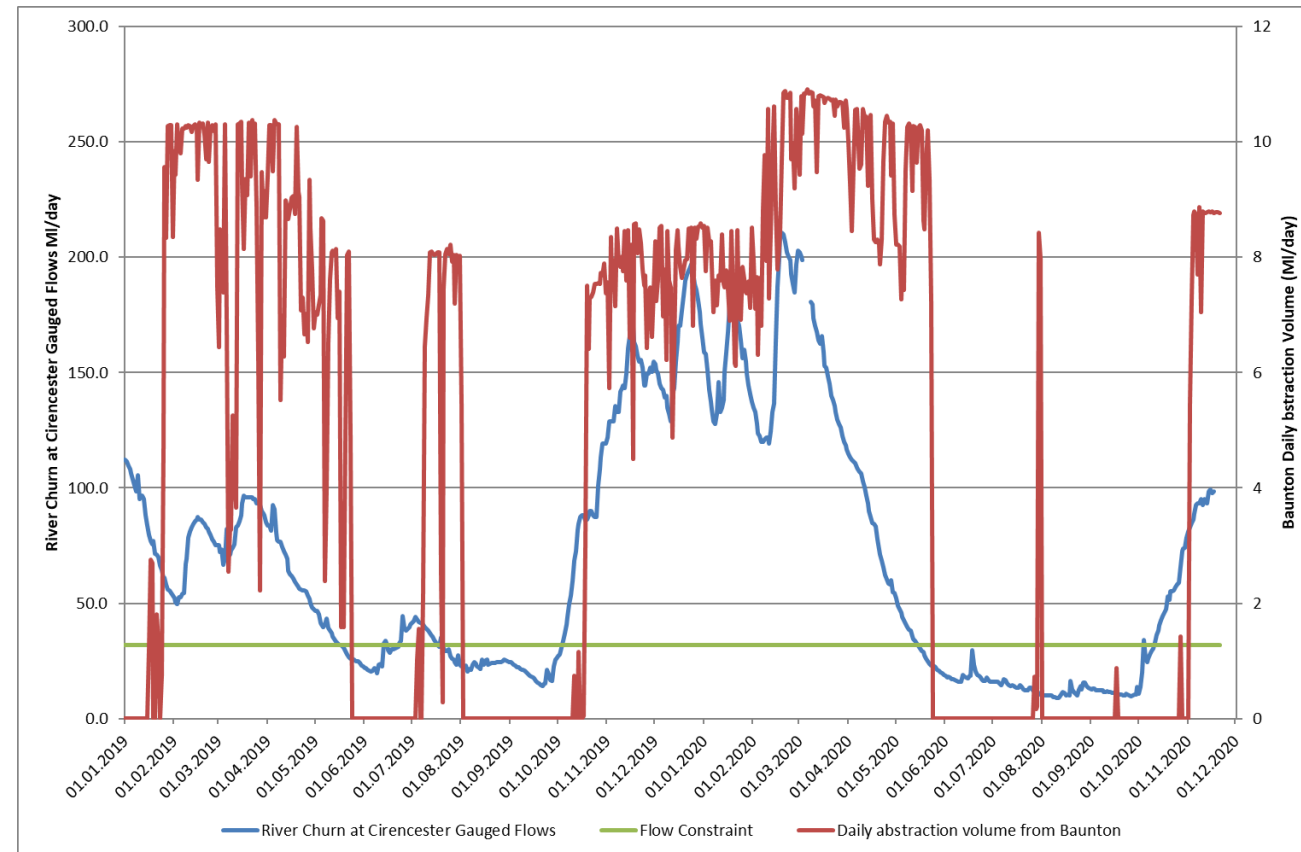
# Groundwater pumping at Baunton PWS



# Groundwater pumping at Baunton PWS

## Abstraction licence changes

- EA approved Thames Water's application to allow emergency pumping at Baunton for up to 10 days a year when flow in the River Churn is  $<32$  MI/d
- Strategic trunk main from Farmoor to Faringdon has burst on a number of occasions. Usually fixed within 2-4 days and is planned for replacement by end 2023.
- To support Swindon's water supply, we implement emergency pumping at other groundwater sources first, e.g. Latton & Axford, but high demands during last 2 years has required further emergency provisions at Baunton to be in place until 2023.
- Groundwater pumped from Baunton on 6 days during July to October 2020 under new emergency licence
- Continuous pumping at Baunton recommenced in November, after River Churn flow rose to  $>32$  MI/d in October



# Prognosis & Next steps

## Stream flow recovery

- Groundwater levels in the Cotswolds have responded significantly to October rainfall
- Signs are good for continued recovery of groundwater levels during winter 2020/21
- Flow in Daglingworth Stream & Gumstool Brook are likely to recover in response to rising groundwater

## Monitoring

- Detailed observations are highlighting longer lengths of the Daglingworth drying than noted previously
- Groundwater level monitoring can begin to be analysed in further detail as the data record increases, giving insight into the groundwater stream flow interactions in Stratton & Cirencester

## Data collation & analysis

- Consider how to enhance visualisation of stream flow observations & groundwater levels on web site
- Integrate observations with publicly available rainfall & river level data to improve insight into stream flows and how they change
- Integrate the influence of the Cotswolds geology on stream flows around Cirencester

