Cirencester, Siddington, South Cerney, and the Water Park

Floods: 23rd – 31st December 2020

Residents' Report January 2021

Churn Catchment Flood Prevention Group

This Initial report contains information and reflections collated regarding recent flooding; including information from previous local meetings, recent Zoom meetings and residents' accounts shared vocally, via email and social media. Most of the information here is subjective; this is intended to be a working discussion document only. It is not intended to be used to denigrate in any way, but as a means to support working towards improved future flood resilience.

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Summaries

This section contains overviews & summaries of all the information gathered.

Report Summary

The **data** appears to suggest that a build-up of rainfall began the process of our Christmas floods in 2020. It culminated in a significant amount (42mm) dropping in the area north of Cirencester on the 23rd. What then followed was a swelling of river water very quickly, both in the Churn (passing 0.7m on the 24th) & the Dan (Daglingworth Stream) to flood potential levels. Local observations and photo evidence suggests the river levels were significantly greater than in previous recent years. Looking at the data it appears ground water may have played less of a part to an extent, as its levels did not rise to their maximum until the end of December (23rd, 122.706 mAOD at Perrots Brook; and into January (Jan 1st: 125.063 mAOD – Peak). However, it is recognised there is a lack of detailed data for the areas in particular where the flooding occurred.

Observations show that at its worst, the floods this time forced some evacuations of properties in some areas. This is difficult enough being over the Christmas period, let alone combined with the middle of a pandemic. There were issues of sewage flooding into some properties, onto roads, public recreational land, and into the Churn. Also a great deal more residents were unable to use their facilities over the Christmas period up and down the Churn Catchment. Rivers and stream culverts burst their banks in numerous locations, contributing in some areas to flooding of roads, some of which needed to be closed, and to potentially threatening property damage. Some basements were flooded, particularly in Cirencester, some of which hadn't seen such incidents for at least fifty years. During the floods a substation had to be switched off and emergency generators were still in place during most of January. Ongoing efforts to tackle sewer issues around the Abbey Grounds area proved particularly unsuccessful, as well as ongoing sewage issues around the Cherry Tree Road area, and blockages and high levels of debris have been observed in rivers, in some key areas. One thing that is key to note here, is that this year's flooding seemed to behave slightly different to previous recent episodes.

What's different this time, what's changed? Although it is by no means an exhaustive list, some key suggestions that have emerged include:

Alterations to water pipes, drains & sewers: Thames Water's work to resolve ongoing issues and improve the local infrastructure may have shifted the problem along. Another key factor worth considering was a major water pipe breach at the Whiteway lights just weeks beforehand.

Trash screens, sluice gates & blocked pipes/bridges/outflows: Once debris and blockages in key areas were cleared, it had a beneficial impact. Note, there are also reports that blockages in some areas continue several weeks after being reported. There is also a question mark hanging over the operation of sluice gates during the floods, and potential impacts.

Tree felling: There are a number of locations within the area where a significant amount of mature larger trees and large areas of smaller trees have been felled over the last year or so; there is evidence to show they slow down water transit to the ground, and into rivers. Also high winds in late

autumn may have contributed to river debris causing blockages at bottleneck points, especially with the level of dead fall potential from Ash Dieback of recent years.

Persistent & heavy rainfall: The data shows particularly heavy rainfall especially in the 24 hours when flooding began. It would be interesting to compare this to past flooding events. Also does Climate Change play a factor? Flooding has occurred approximately every seven years since 2000.

Water course anomalies & other factors: within this report we have highlighted the continual changes to watercourses over time, there have been recent changes around the town that may have led to the different profile of flooding this time - particularly around Waitrose & Kwikfit. Other factors that may have played a part include resurfacing work, lack of agency resources and legislative blocks to investment.

Historically research has shown this area is prone to flooding, and it has been an ongoing issue balancing human habitation with local waters. The convergence of two water courses, the Great Oolite Aquifer underneath, and the rising of many springs in the area contribute to the potential for seasonal flooding. Combine this with a sewer system that's been constantly altered over recent centuries, significantly without sufficient investment to make it adequate for the amount of population growth, and the recipe for flooding is easy to see. Understanding the detail of the history of the area, what's changed, what's worked, what hasn't, how the water has been utilized in the past, could well provide some answers for how we address this problem going forward.

What's next? What has come out strongly from the discussions and meetings amongst residents is a desire for change. Not only spurred out of the upset and frustrations felt, and damage caused by the floods, but also out of a realisation of what an opportunity this could be; what positive changes could come out of tackling this. We would like to see a partnership formed between all main agencies and authorities involved. At the time of writing it appears the Cotswold District Council is working to take the lead on this. Suggestions include ensuring the partnership involves Thames Water, The Environment Agency, The Bathurst Estate and other key landowners, FWAG, town, district and county councils, electricity companies, the emergency services, and local residents. We would like to see (1) a robust, transparent **emergency action plan** evolve to tackle potential future events, and (2) clear action undertaken to mitigate, even **harness seasonal water flooding** and use it to our advantage, instead of detriment. Both of these objectives it is felt are achievable and realistic. Contained within this report are some suggestions for how some of this can be achieved. However we recognise solutions and actions are part of the function of the partnership to work on and to instigate. They are merely represented here to show solutions are possible, and to focus the attitudes of the partnership upon what can be achieved, rather than what can't. We would like to see collective responsibility for solving these problems taken up by all parties, with collaboration in this work. Other communities and agencies around the country have demonstrated this is possible, as well as showing more transparency and accountability in the process. Above all much more effective (**impactful**) change is desired than has been shown up to now.

This report also contains some solutions that residents can put in place now to help ourselves whilst waiting for a partnership to deliver, as well as issues that may need to be considered through this process, and some additional relevant reading that might contribute to greater understanding and finding solutions. The appendix contains more detail, ideas and personal accounts along with case studies provided by those affected, who contributed to the creation of this report.

Time for change

It should be noted that there is perhaps little of surprise to many recipients of this report. Cirencester isn't new to flooding, experiencing it many times in recent years (2000, 2007, 2012, 2013/14) (as well as flash floods affecting some roads such as Melmore Gardens whenever there is a major storm). The Churn Catchment Flood Prevention Group has been working tirelessly for the last seven years offering support to other residents by engaging in considerable research and learning, as well as addressing and collaborating with the previous flood partnership, all of which has been done on a voluntary basis, with much goodwill by local people. Some changes have been made, some solutions have been put in place, and those are to be celebrated. However it is no longer sufficient to continue to make small changes at the previous pace with flooding becoming such a regular issue. The residents of the Churn Catchment deserve better; we need faster responses and more action. Those in positions of power have a responsibility to do more. If you are in a position to effect change, ask yourself, 'how would I feel if I had to be evacuated? Or had effluent flowing through my property? Or was stranded in an emergency? Or was met with flood water in my home, the like of which I hadn't seen before? Or if I couldn't use my toilet or shower for days on end!' In the 21st Century, in the Cotswolds, this isn't acceptable. Yet there is an opportunity here to step up and get it right. Please take up that challenge. We know this issue to be solvable.

Churn Catchment Flood Prevention Group

Data

Rainfall data:

3 local monitor stations: Rapsgate near Woodmancote; Miserden; and Shorncote, near South Cerney. All stations report similar rainfall patterns. (More information can be found in the Appendix).

Source: https://www.gaugemap.co.uk/#!Map

Rapsgate R36, (near Woodmancote & Rendcombe, feeds into the Churn)

2020 figures:

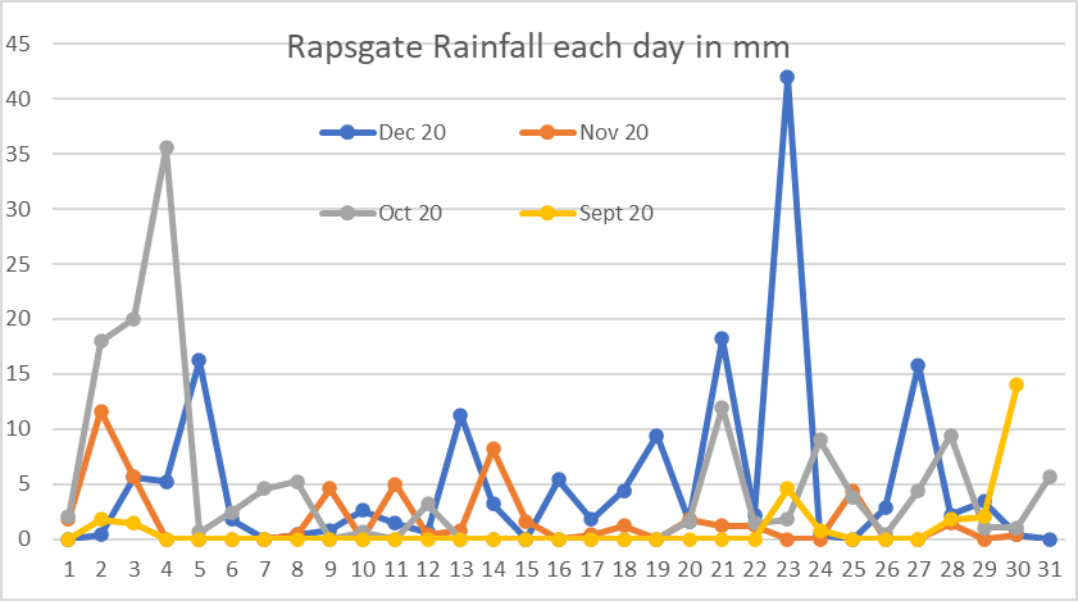
December 2020: highest level: 42mm 23/12

December Volumes: 159.5mm (Spike of **42mm on 23rd**, average 5.15mm/day)

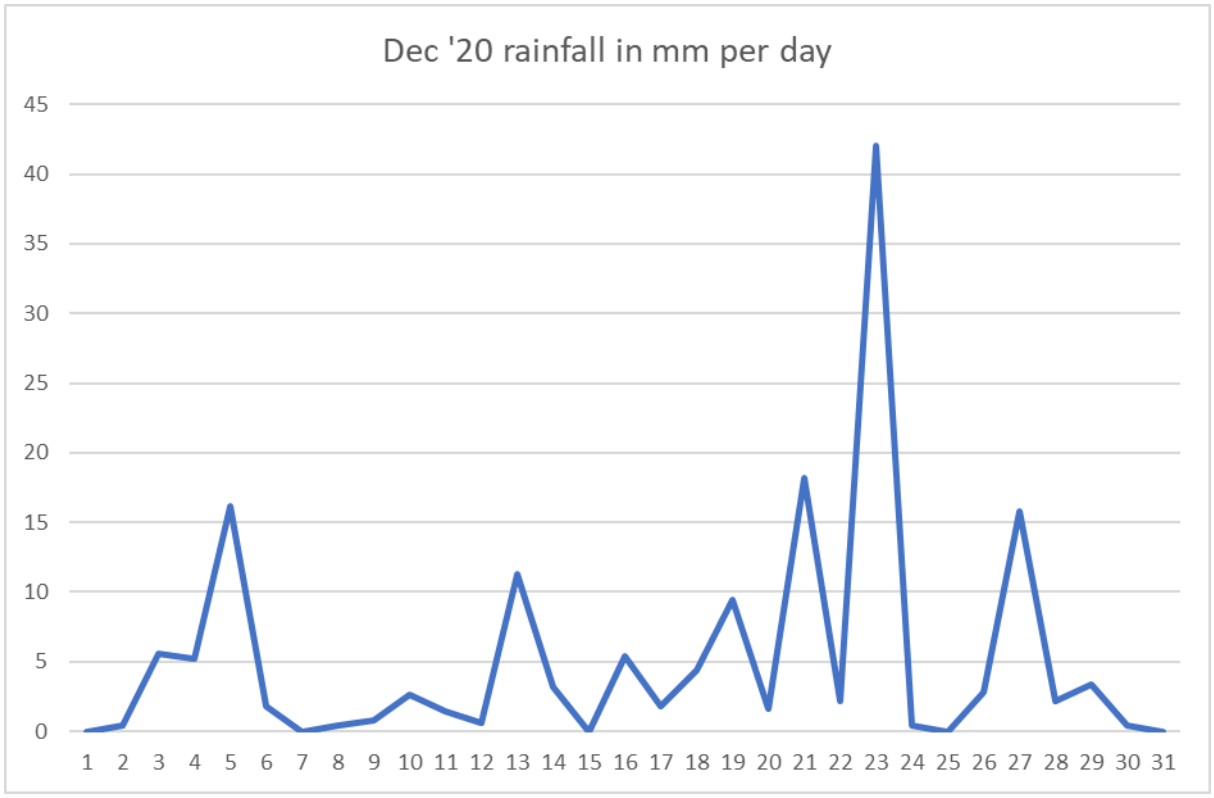
November Volumes: 52mm (Spike of 11.6mm on 2nd, average of 1.73mm/day)

October Volumes: 143.6mm (Spike of 35.6mm on the 4th, average of 4.63mm/day)

September Volumes: 26.4mm (Spike of 14mm on the 30th, average of 0.88mm/day)



December Rainfall, Rapsgate:



There was a significant spike in rainfall on the 23rd December at this location. December being about 3x wetter than November, over 5x wetter than September, and just above October for 2020. It might be interesting to see how that compared to results at other data locations nearby and how that compared to previous years and data around other flood events. It may also pay to have a monitor station in Cirencester and South Cerney in future. At the time of writing some amateur recordings have surfaced locally; two in Cirencester & one in Itlay. Note also, Storm Bella passed through on the 26th.

Ground Water Levels:

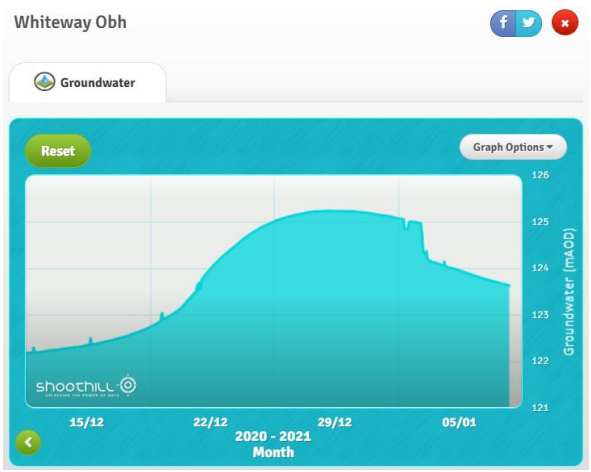
Source: https://www.gaugemap.co.uk/#!Map

Monitoring stations at Whiteway, Hares Bushes, Ampney Crucis, and Siddington

Whiteway OBH

2020 figures:

December 2020:



Measuring at Perrots Brook,

https://www.gaugemap.co.uk/#!Map/Summary/17684/13439

Dec 10th: 121.617 mAOD (metres Above Ordnance Datum)

Dec 15th: 121.787

Dec 18th: 121.959

Dec 19th: 122.046

Dec 20th: & 21st: No data

Dec 22nd: 122.536

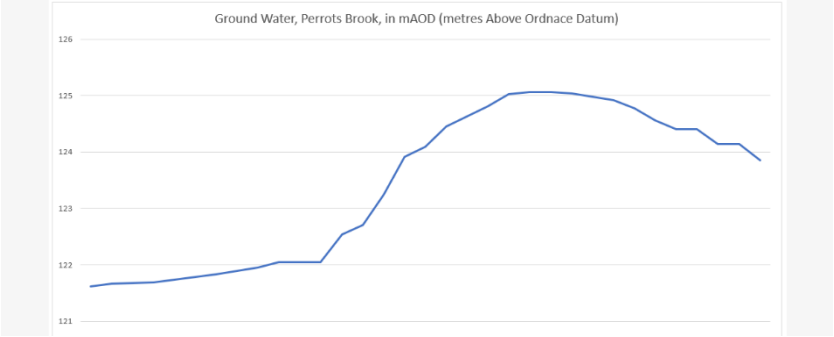
Dec 23rd: 122.706

Dec 25th: 123.912

Dec 30th: 125.023

Jan 1st: 125.063 – Peak

Jan 11th: 123.854

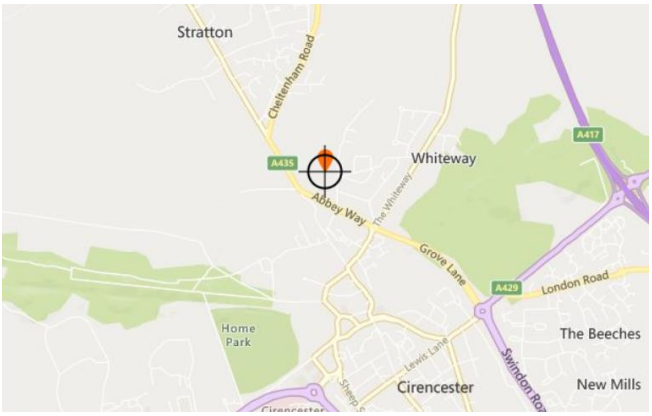


Key to note: the ground water peak upstream of Cirencester tracks behind the dates of flooding. It might be useful to analyse data from other ground water measuring points in the area. It should be noted that this data isn't located in the area that experienced most flooding. See Barton Well monitoring for more local data, https://gumstool.org.uk/barton-well-monitorinng/ . However this is a monthly monitor, rather than a daily one. Is this a potential good site for a sensor?

River level data:

Location of monitoring site: River Churn at Allotments near to 1 Bowling Green Road, Cirencester, GL7 2DY and Abbey Way.

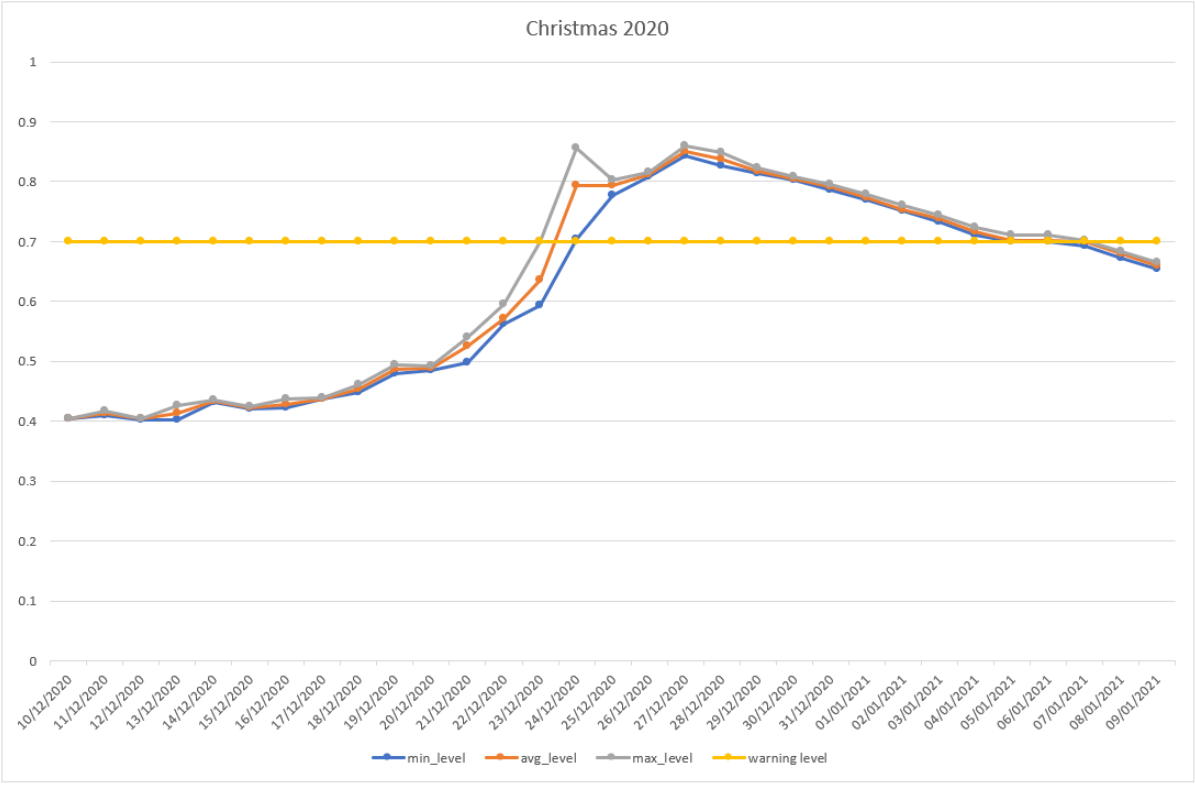
When the water level reaches 0.70m here, minor flooding is possible in this area.



https://flood-warning-information.service.gov.uk/station/7015?direction=u

Other monitoring stations include South Cerney and Cerney Wick. No more known stations north of Cirencester.

Christmas 2020

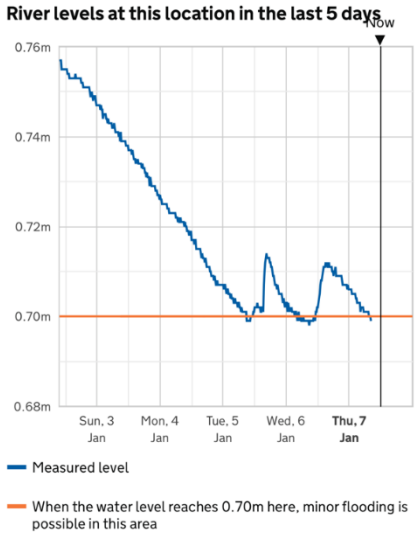


Key to note a flood warning had been issued by Environment Agency on the 23rd December. However the data shows the levels to be below 0.7m (flood warning level) until the 24th, with the peak reached on the 27th (See table below for figures).

River Levels (data extracted from https://riverlevels.uk/churn-cirencester#.X_xuFej7RPY)

date	min_level	avg_level	max_level
21/12/2020	0.498	0.526	0.541
22/12/2020	0.563	0.571	0.595
23/12/2020	0.593	0.635	0.699
24/12/2020	**0.704**	**0.793**	**0.855**
25/12/2020	0.777	0.793	0.802
26/12/2020	0.809	0.811	0.816
27/12/2020	**0.843**	**0.851**	**0.86**
28/12/2020	0.827	0.838	0.849
29/12/2020	0.813	0.818	0.822
30/12/2020	0.802	0.805	0.808
31/12/2020	0.787	0.791	0.796
01/01/2021	0.769	0.774	0.779
02/01/2021	0.751	0.753	0.761
03/01/2021	0.732	0.738	0.744
04/01/2021	0.711	0.717	0.723
05/01/2021	0.699	0.701	0.711
06/01/2021	0.699	0.701	0.71
07/01/2021	0.693	0.699	0.701
08/01/2021	0.673	0.679	0.684

Unusual Alerts:



Note the high levels of river water 6th & 7th January, the Environment Agency reported spikes in flow. This was nearly a week after the flooding and despite the fact it hadn't rained for over a week. What accounts for these anomalies? Is it issues with the sensors? Had someone upstream released water previously held back during the flooding?

Flood warning details for the area over Christmas: https://floodassist.co.uk/flood-warnings/flood-area-info/gloucestershire/061fwf02cirncstr/river-churn-from-baunton-to-siddington-including-cirencester

Frequency of flooding:

Historical Flooding

Dates & Articles:

1869, https://www.wiltsglosstandard.co.uk/news/18982903.nostalgia-flooding-cirencester-nothing-new/

January 1929, The Great Flood https://www.wiltsglosstandard.co.uk/news/18982903.nostalgia-flooding-cirencester-nothing-new/

1999, reported in Wilts & Gloucestershire Standard 23rd March 2000: Work starts on clearing blocked ditch. [P20, Cirencester, A survey of the WATERWAYS passing through the town with special reference to the GREAT FLOOD of 1929]

2000-2001, http://www.cirenhistory.org.uk/nl53streams.htm . Residents recall flooding in Cherry Tree Drive in 2000.

July **2007,** https://www.cotswold.gov.uk/media/35mln4bi/hyder-report-2007-floods.pdf p80

December **2012**, https://www.cotswold.gov.uk/media/wwanwbs3/6205-strategic-flood-risk-assessment-level-2-appendices-may-2016.pdf p2

Winter **2013/14** – basements flooded, https://www.cotswold.gov.uk/media/wwanwbs3/6205-strategic-flood-risk-assessment-level-2-appendices-may-2016.pdf p2

December 23-28th **2020**: https://www.wiltsglosstandard.co.uk/news/18970706.homes-flooded-cirencester-76-left-without-power-christmas-day/

Note: this list is probably incomplete.

Most flood issues seem to occur around **December, January.**

Since 2000, it's happened approximately **every 7 years.**

Flood Observations & resident accounts (overview)

23/12/20: flood warning issued by Flood Information Service (gov.uk) shared by several residents on social media (Facebook: Cirencester, A Local Town For Local People).

Reports came in of minor flooding up around Bourton and the Slaughters, then along the Rivers Churn and Coln. Upstream in the Churn, **North Cerney** had some car park flooding and toilets became out of action. In **Baunton** the river was high enough to breach across the road, just down from the bridge over (which is unusual). The levels in the water meadows in **Stratton** (either side) were very high, feeding from the Churn and The Daglingworth Stream, as was the Daglingworth Stream between Daglingworth and Stratton. Some flooding reported in **Daglingworth** itself and minor road and path flooding in West Stratton (Coffin trail, School Hill and Barn Way).

24/12/20 Residents in Gloucester Street and Gooseacre Lane received the flood warnings from the Environment Agency with a phone call, text message and email.

24/12/20: Photos and reports coming into social media of flooding around Cirencester and Siddington. Paths and Roads flooded including Riverside Walk, Spitalgate Lane, Trafalgar Road, Barton Lane, and The Common (Siddington). Also in Jack Gardner Memorial Gardens both sewer manhole covers were shown to be covered in floodwater. Water meadow levels high in Stratton (either side), and next to the swimming pool.

24th – 31st December 2020

Cirencester

Water meadows around the Swimming Pool & Powell's Church of England Primary School field were very full. Although the horse field next to Powell's was not as flooded as in previous flood events. The flood defences put in place around the school buildings at Powell's looked to be in use. The whole of the school playing field was flooded to some depth.

Riverside Walk by the swimming pool had water flowing over the top of it especially by where the sluice gate is. The entrance to Cirencester Park (Bathurst Estate), Barton Lane entrance was flooded between the dovecote/barns and into the field behind the swimming pool. The area between Cirencester Park and Riverside Walk was flooded - the water was coming from Barton Mill and was in spate.

Roads flooded: Spitalgate Lane **(road closure),** Estcote, Dugdale and Hereward Rd, Trafalgar Road, Barton Lane, The Mead, Swindon Road, A419 near Tesco **(road closure).**

Basements were flooded: in Dollar St, Thomas St, Gloucester St, Gosditch St, Market Place, Victoria Road, Coxwell Street and St Peter's Road. It should be noted that residents reflected that St Peter's Road hasn't flooded for over fifty years. Consequently some basements weren't just cellars but rooms with furniture, valuables and electricity.

Sewer issues: around Blake Road, Hereward Rd, Estcote and Dugdale Roads (near Abbey Grounds) particularly suffered. 2 houses were evacuated. Near to City Bank and the Willows, around 100 + people were affected by sewer issues in the area. Toilets were out of action for several days, some sewage outflow into gardens etc. The generators and tanker were brought in to pump out at the Norman Arch to deal with sewage by the 26th.

Evacuation: People from Wildwood Caravan Park; Some residents on Estcote and Dugdale Roads.

Power: SEE still have an emergency generator at Estcote Road substation (15/1/21). They responded very quickly ensuring emergency power was on site at Abbey Grounds.

Blockages: There are reports of vegetation, large tree trunks and other types of debris blocking various bridges and outflows. There were also anomalies relating to the sluice gate operations, photos are inconsistent with reports of how the 'Memorandum Of Understanding' (MOU) was followed, at the Gloucester Road Flood Sluice.

Environment Agency staff reported clearing the trash screen at Powell's school and by the open air pool every day and by the bridge twice. They said the bridges by the swimming pool have pipes under them which trap debris. They are hard to clean and of course this increases the risk of the water rising and washing over the path backing onto The Mead and the pony field by Powell's School. They also said that there were large amounts of debris, logs, wood chippings and bucket-loads of apples.

Road closures and driving: Issues also reported of bad driving, including driving too fast through flooded roads, causing further flooding to houses alongside, or ignoring road closures.

In previous years when Spitalgate Lane has flooded they have opened Gooseacre Lane entrance onto Abbey Way more quickly. Spitalgate Lane was shut for about 3 days before they opened Gooseacre Lane. More road signage is needed to around the town to let people know Spitalgate Lane is closed.

Cirencester to Siddington, Reports of high flood levels particularly around Southmead, Cherry Tree Drive and then 'The Common' area. Sewage pipes were overwhelmed with sewage emerging from drains around Cherry Tree Drive onto the road and into gardens. Wildwood Caravan Park had to stop using the sewage system, porta-loos were provided, and evacuation to a nearby hotel was offered. A tanker was deployed to pump waste away. Some houses in 'The Common' are known to have been evacuated due to flooding. For further detail please contact the chairman of Siddington Parish Council.

South Cerney,

The Churn in the middle of the village was ok. Most issues came from sewer flooding and Shire Ditch, west of the village, which takes the overspill from the fields and the outflow from Shorncote sewage works. The main issue has been sewer flooding for a number of years. This year the new Redrow houses were affected for the first time and an overland pumping station has been installed as a temporary solution. Again issues reported with bad driving, including driving too fast through flooded roads, causing further flooding to houses alongside, or ignoring road closures.

Cotswold Water Park,

At Hoburne Cotswold Holiday Park in Cotswold Water Park, it came in at the highest part of the park from South Cerney (worst witnessed in 20 years). They were battling a continuous flow of water from a fishing lake between themselves and the South Cerney industrial estate all day (26-27th Dec), which breached the banks. The water has filled up all 4 of our own lakes and the last one is now ready to burst onto the Spine Road area around the cross roads with Broadway Lane. Concerns over drivers' safety, turning around on Spine Road where there were road closures. If co-ordinated better the Hoburne Park entrance could have been used which would have been far safer.

Other issues to note,

There have been continuous issues going back for at least 8 years with sewage around the resident's area next to the Abbey Grounds and the Norman Arch (Blake & Hereward Road area in particular) and not just when the town has experienced flooding. This also leads to sewage often ending up on the Jack Gardner Memorial Gardens and Abbey Grounds recreational areas, as well as next to the children's playground, and going into the river. This is a public health hazard. There were areas roped off in the Abbey Grounds this December (2020) but there did not seem to be any sign of notices not to walk on the grass due to sewage contamination. A reserve pit and penstock valve were previously fitted to try and alleviate the problem, but these often fail. For the last eight years there has also been a pump and a tanker in place most winters (which has a financial impact for house values as well as for Thames Water). Residents feel that a rethink and a much more robust, long-term and adequate solution needs to be put in place in this area.

Pumping out reserve pit, Blake Rd:

Children's playground and sewage water:

Jack Gardner sewer drain flooded by river:

People reported problems with lack of information and understanding. No one person or organisation seemed to be taking control when flooding affected people. There did not seem to be a clear action plan when houses/roads were flooded. It was interesting to see that the electricity company had generators around Hereward Road and Abbey Grounds area quite quickly. People also reported problems with getting through on telephone numbers, and the quality of information once they did get through was poor.

There were some frustrations over inter-agency co-operation (or lack of!) In particular road closures weren't thought through and further aggravated problems in South Cerney.

Potential underlying causes

What was different? What's changed?

There are several factors of note that have changed recently and may have contributed to the flooding this Christmas:

1. **Water pipes, drains & sewer work:** There have been a number of ongoing works carried out. Thames Water continue to 'line' old sewer pipes to prevent ground water infiltration. Is it possible that these improvements have shifted the problem along to new locations? There have also been a number of other drain / flood alleviation works carried out in the area recently (see detail section for locations). Just prior to the floods there had been a major breach and works carried out at Whiteway/Abbey Way lights a couple of weeks before, could this have been a contributing factor to high ground water levels? The generators and pumping out hadn't been in place by the Norman Arch, as they have been in previous years. A flood warning had been issued by the Environment Agency - had storm drains been pumped out quickly enough, as they have in previous years when this happens?

2. **Trash screens, sluice gates & blocked pipes/bridges/outflows:** It's noted that debris build up will have an impact on trash screens, pipes, and bridges allowing flow. There were reports of several sites (see appendix) where debris was noticed and subsequently cleared by the Environment Agency. They will clear debris if notified. One area that seemed to have a big effect once cleared was the relatively new outflow installed by the Bathurst Estate between Texaco and Barton Lane that had vegetation blocking it. There have been some reports that perhaps someone upstream opened a sluice to protect their crops? There also seems to be some questions around the sluice gate operation at Gloucester St/Abbey Way. Members of CDC and CTC both report the Memorandum of Operation was followed during the flooding. The Town Council have fed back that:

   'On the 24th December 2020 the Environment Agency (EA) provided sand bags for deployment in the Hereward Road area. On the same day CTC staff phoned the EA to let them know they would open both Gumstool Brook and Gloucester Street sluices as per the agreement. This was done on the basis that the water level was at/above 0.2m at Gloucester Street, with the sluice remaining open until the level came down to 0.15m. At Gumstool Brook, the sluice was opened as the water was coming over the path. At this moment in time Thames Water staff were pumping by the depot entrance on Hereward Road so a courtesy call was made to Lee Griffith to let him know that the sluices were being opened. As soon as the EA and Thames Water were informed, both sluices were opened. We understand that Bathurst Estate also opened their sluice gate. The sluice gates were checked by CTC staff at Gloucester Street and Gumstool Brook on the 27th December 2020 and showed no change. Sluice gate levels were subsequently checked on the 29th. On the 3rd of January the Gloucester Street sluice showed a water level of 7 on the gauge, an improvement but not low enough to close the gate. On the 5th of January, the Gloucester Street sluice levels were showing slightly lower levels than the 3rd January 2021 and the Gumstool Brook sluice levels had dropped significantly; both sluices were closed.'

   Photos from different members of the public showing the sluice, the large, flood section looks to be closed on the 24th, 26th & 28th. On close inspection of the photographs it is possible to see some slight movement of the main gate but this is difficult to read due to no apparent visible gauge. The Town Council statement also suggests the MOU was/is not being

followed as river levels were allowed to rise well above the 0.2m level before the operation of the gates was implemented. On 5th Jan when the gates were closed the river level was 0.7m

December 24th at 10.29:

December 26th at 15.48:

December 28th:

According to the MOU:

(https://static1.squarespace.com/static/563789b6e4b03c7ded1a9ff2/t/5dcabb4de381d24d49fc0427/1573567314578/Memorandum+of+Understanding+Sluice+Gate+Operation+2019+Update+Web+Version.pdf)

‘4.2.1 Gloucester Street Sluices (Cirencester Town Council)

a) Normal, non-flood conditions:

i) Keep the two small gates raised above water level.
ii) Keep the large gate in the closed position.

b) Flood conditions:

i) When water levels reach 0.2m (111.02m AODN) on the gauge board commence opening the large gate and continue as required to prevent the head water level from increasing until the gate is fully open;
ii) Inform the owner of New Mill of each gate movement;
iii) Once the gate is fully open inform the Bathurst Estate that all of the sluices at Gloucester Street are fully open;
iv) When water levels start to fall and record 0.15m on the gauge board and the rainfall forecast is favourable, start to shut in the large gate and continue as water levels fall until the gate is fully shut. The gate should be fully closed when the reading on the gauge board falls to 0.1m.'

Several emails have gone back and forth between our flood prevention group and the CEO of Cirencester Town Council, asking if records of sluice operations are kept, and if so, can they be seen? Questions have also been asked with regard to the town's resilience plan and its operation. It has felt difficult to obtain this information, that there has been a lack of transparency.

3. **Tree felling:** there are a number of locations within the town, Cirencester Park and upstream where significant large trees or large areas of smaller trees have been felled or died over the last year or so, without being replaced at all in some locations, or with much less mature ones in others. Although trees don't absorb much water in winter, they do slow down its transit to the ground, by their sheer mass and structure. they also hold moisture within themselves, and their roots systems allow water to penetrate deeper into the soil structure and so reduce run off into rivers. They also help retain the bank integrity of rivers, reducing silting. There were also high winds in late autumn which brought branches down (particularly where there is Ash Dieback along water courses) which may not have been cleared and contributed to blocking some of the town's waterways. For some examples of locations, see the appendix (p49-50).
4. **Persistent & heavy rainfall?** Initially there was some uncertainty and conflicting opinion around this, and it potentially needs further investigation. The data at beginning of the report seems to suggest there was. Could Climate Change be a factor? There is much historical evidence of flooding in the area, but how does its frequency of occurrence and severity compare? What are the trigger points or rates?

5. **Water course anomalies:** Water courses have been changed a lot in Cirencester over previous centuries, the Romans diverted the flow of both the Churn and the Dan, to flow outside the city walls. Since then, the flow has been altered, culverts created for new building work, to utilize the power for mills, transport from train via canals, diversions for the Abbey, and alterations and creations of sewers to prevent illness. It also has itself some naturally occurring interesting factors. From rivers converging onto a plain, to spring waters emerging from the Great Oolite Aquifer. For more detail see the section below, *'History of Cirencester's Waters'* and links. The arch under the barracks was dry so it's wondered if the water was backing up under Sheep Street?

6. **Other Factors:** road resurfacing work has taken place this last year including around Cirencester, Cheltenham Road following the Churn upstream and the A417 dual carriageway. Could these changes to surfaces and any potential works to road drains have had an effect on water movement? Waitrose car park is no longer flooding after they had alteration work; have they now got a soakaway and did this contribute to ground water levels?
   Also work carried out around Kwik-Fit seems to have stopped the flooding issues there and further along Watermoor Road at junctions with King Street and The Avenue.

   Other factors that have been mentioned: are the Environment Agency under-resourced? Does legislation holding back Thames Water spending money on carrying out more repairs and flood defences? Is there a lack of a clear transparent and communicated local flood emergency strategy (or areas that need working on)?

History of Cirencester's waters (from the 1800 – 2000s)

The various courses of the water through Cirencester have changed many times over the last few hundred years. Gravity and drops in altitude have an impact. The surrounding land upstream of Cirencester is particularly made up of hills and valleys, meaning water flows at quite a pace into the town. It is thought, looking at archaeological evidence, that civilisation occupied a site further north, on one of these hillsides, around what is now Bagendon, before Cirencester came into being.
When this area came to be known as Roman, its location may not have been their first choice, Cirencester itself is built on a plain, so velocity of water slows considerably, it would have been a marshy area prone to seasonal flooding. The roman roads converge more to the east of Cirencester's main location, which might have been a more obvious site. However there is a significant, possibly late Iron Age burial site known as 'Tar Barrow' here, which may have contributed to their final choice of settlement. They may have also seen the local waters as an asset, utilizing it for drinking, crops, and possibly sanitation purposes themselves. In creating Corinium, they diverted the river Churn and Dan around the city walls, containing the city upon the underlying gravel bed.
Historically, aims to reduce Cirencester flooding have focussed around considering and trying to speed up the flow on this plain, with the clearing and maintaining of channels and suggestions of introducing weirs. Sluice gates have also been a longstanding feature. The underlying geology plays a key role. The Cotswolds may be called emphatically "the land of rivers and fountains of water". Winter spring water is a major factor in flooding in the area, where springs are fed from the underlying gravel beds. The river Churn and the river Dan (Daglingworth Stream) were historically kept separate, as they flowed through the town, as the Dan would take ground water swell in winter, particularly noted in the accounts as rising within areas of Cirencester Park.
Some water has also been diverted to service the mill industry (Stratton, Barton, New, Preston and Siddington Mills). Which may account for the joining of the Dan and the Churn. As well as other tributaries in the other parts of the town. Some changes have also been made to enclose the sewer system within the town, to reduce disease and illness. Not always with careful enough construction or consideration.
A canal used to exist, a feeder from Hammond Way next to the old train station which runs under Waitrose, close to Sheep Street, Ashcroft and St Peter's Roads, along Whitworth Road, under Trinity and St Michael's Road, under the dual carriageway, under Midland and Elliot Road, and into upper Siddington alongside Pound Close and splits just next to the playing field (see map link below). Historically this may have carried some of the winter waters away or have been used to take sewage. It's uncertain how the canal was filled in to then be built over, and so does it still carry a water course? There have also been manmade bends and obstructions built as dwellings have been altered and new ones built. It's interesting to note, there seems to be little historical record of upstream management of the river Churn or Dan (Daglingworth Stream).

Ref,

- A survey of the WATERWAYS passing through the town with special reference to the GREAT FLOOD of 1929 By Robert Anderson, former High Steward of Cirencester

With particular thanks to George Brooks & Simone Clark for the history research.

- The foundation of Corinium, https://coriniummuseum.org/2019/03/the-foundation-of-corinium-an-insight-into-the-formation-of-one-of-britains-first-towns/?fbclid=IwAR1ZjPPkrFC1Q7Atg64W4F-EPs1tGRGBzFSlrGgrqYy4KnSIKgJdbxBXB2k

- Map link: https://maps.bristol.gov.uk/kyp/?edition=glos

Other articles that might be of interest:

- Cirencester: The Interpretation of Streams, by Richard Reece and Peter Broxton, taken from Cirencester Archaeological & Historical Society *Newsletter 53: 2011*
  http://www.cirenhistory.org.uk/nl53streams.htm

- Cirencester Town & Landscape, Timothy Darvill & Christopher Gerrard,
  in particular Chapter 4, background data (p40- 47)

  http://www.cotswoldarchaeology.co.uk/wp-content/uploads/2011/07/Cirencester_Town__Landscape_1st-half.pdf

- Victoria County History, Gloucestershire vol. XVI – Cirencester and district,
  https://www.history.ac.uk/research/victoria-county-history/county-histories-progress/gloucestershire/cirencester-and-districtgloucestershire

- Cotswold Canal Trust - for information about the canal basin and feeder streams, the canal was culverted in 1975, when Sheep Street was diverted.

  https://www.cotswoldcanals.org.uk/

Possible Recommendations (see appendix for more details)

1. **A Working partnership** between all relevant bodies, committed to taking action specifically to reduce further likely hood of issues and being better prepared for emergencies, should be formed or improved upon. It is felt that this needs to **not** be the 'Upper Thames Catchment' (as in the past) as that covers too broad an area, neither should it necessarily focus just on Cirencester, but instead have a 'Churn Catchment' focus, as the issues affect us all along its water course. For example, the National Trust have catchment projects elsewhere working with water and environment agencies. Also the Calderdale Flood Partnership is a great example (https://climate.leeds.ac.uk/wp-content/uploads/2016/11/Calderdale_flood_action_plan_-_SUMMARY1.pdf)

   The desire would be the creation of a formal flood resilience partnership, with an agreed programme of works, and a flood mitigation plan, which was clear about responsibilities. It would also allow the community and local authorities to apply for funds from local, district, government and other grant giving organisations to fund the work that needs doing to mitigate flood risk. The flood prevention group understands that Gloucestershire County Council (GCC) are the statutory body whose role it is to produce emergency plans but that this has been delegated to the Cotswold District Council (CDC). There appears to be some historical lack of clarity around statutory requirement to provide emergency plans. As stated it appears to sit with GCC but delegated to CDC and CTC (Cirencester Town Council). It currently is felt that none of the councils are delivering this, so where's the accountability? The group particularly want to see a progressive, functioning collaborative group, that has the power and agency to resolve these matters. We have concerns over past inter-agency and authority collaborations as well as the public annual flood meetings chaired by Sir Geoffrey Clifton-Brown, in terms of their lack of effectiveness in flood mitigation over the years. We would like to see 'effective' change in action, with less cross-accusations, less telling of woes and with all parties involved 'owning' their roles, and so fulfilling their collective responsibilities to residents. Please implement solutions, far more progressively.

   For further information, see,
   https://www.gloucestershire.gov.uk/your-community/emergencies-and-your-safety/flooding-and-drainage/

   https://www.local.gov.uk/topics/severe-weather/flooding/local-flood-risk-management/managing-flood-risk-roles-and

   and https://www.cotswold.gov.uk/communities-and-leisure/support-for-communities/emergency-planning/

2. **Research:** have a comprehensive understanding of where we are. It would be advantageous to map everything, Water flow, diversion, sluices: the history and how the water was used. Who has responsibility for what? Some of the historical information and water course mapping over the entire lifespan of Cirencester's history is currently underway within the group.

3. **Flood Action plan** – if there isn't a current one, then create or improve one [CDC/CTC/all main agencies/Community groups]

- To include processes and procedures clearly documented and transparent to all parties. Include: key responsibilities (with a view to attributing to local people, who will be quicker to respond, have local knowledge, and are more likely to be present during holiday periods, which is typically when floods happen, and have vested interest in outcomes);
- and an improved communication strategy (amongst the different agencies & with residents);
- and a flood Information pack for residents (particularly those not on social media) - a 'what to do if' guide, with important phone numbers.

4. Build in **flood resilience** (river (fluvial), ground, and sewer flooding):

- **Alert systems:** better and more monitoring was suggested would improve our outcomes. More points of monitoring of river, ground water, and rain fall levels, trash screen clearance and sluice gate operation. This could be achieved by putting more monitoring points in – gauges, which could be managed by,

    a) **Local Volunteer Flood Wardens,** to regularly check levels, trash screens, etc. and to record and communicate these to relevant parties and report blockages and flood problems via the EA (Environment Agency) phone number 0800 80 70 60. As well as offering support in flood emergency for road closures, sand bagging, information sharing and more. (This would be easier to set up in a relatively short period of time, and cost less.)

    b) Investing in **electronic alerts:** flow & level monitors, or CCTV in more key locations.

Tackling Sewer Flooding: It is felt that this 'hazard to public health' causes the most significant issues and needs a priority of focus. It may be that in mitigating some of the other flooding issues, sewage problems decline, but we are calling for Thames Water to:

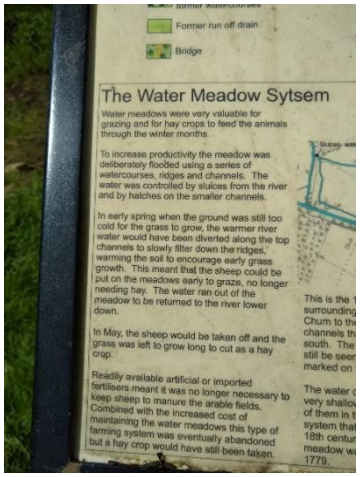
- Dramatically improve our sewer capacity and security
- Continue to line the sewer pipes within Cirencester and South Cerney to reduce infiltration
- Look at finding better more resilient long-term solutions to the issues around the Abbey Grounds housing, other than second tanks, with failing valves, and generators pumping out.
- Likewise around Cherry Tree Drive and other sites that often see effluent emerging.
- Consider creating capacity by diverting other sewer systems elsewhere, or building additional systems.
- Inform us of progress of working with residents to de-couple their rainwater from roofs from the sewage system (see Thames Water Drainage plans, Cirencester p21 & p25)
- https://www.thameswater.co.uk/about-us/regulation/drainage-plans?fbclid=IwAR1h487P6whs3Ls1oZZHn0M1sIAKWfqGrpvlYocbbec9ksVNTcUZvJa0Dl8 Click on 'latest reports', 'show 10 more' to access Cirencester's plan).

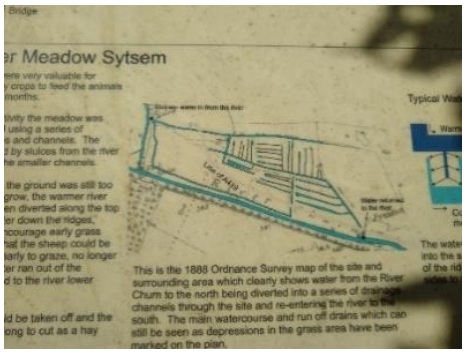
  Also can Thames Water look at stopping the sewer access covers being overrun by flooding by river water in particular sites, including the Jack Gardner Memorial Gardens (see appendix p47 & p54).

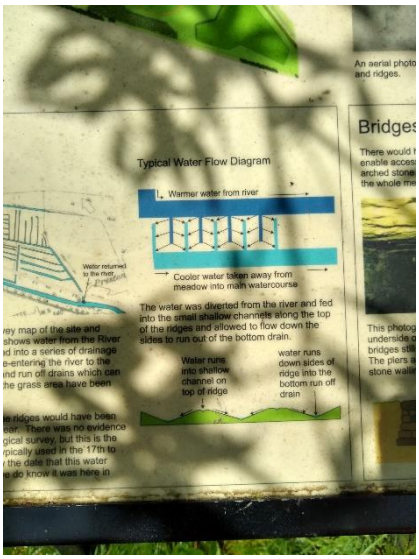
- **Tackling river flooding:** Churn and River Dan (Daglingworth Stream)
  Once the overflow on riverside walk between Texaco and Barton Lane, was cleared it was felt this had a significant impact on levels in the surrounding area. Could some screening be constructed to stop the pipe becoming blocked, either using poles and branches, gabions, or fitting a trash screen?

  It was agreed by all who fed into this report that asking FWAG (Farmers & Wildlife Advice Group) for their help and involvement could make a huge difference: In particular by looking at Natural Flood Management, working with landowners and farmers between Severn Springs and Cirencester, and possibly between Duntisbourne and Stratton. This could include slowing the rivers down creating more meandered flow, using 'furrows' off the river course (as is currently working in Stratton Meadows - see pictures of Kingshill Meadow Country Park information boards below) and high level natural dams for winter flows, both creating more water meadows. The benefit of this system is the flooding of low land pastures, helping to create better feeding conditions earlier for livestock, combined with Biodiversity funding.

  Kingshill Meadow Country Park: the Water Meadow System:







- Also tree planting on lower, steeper slopes, or re-instating/ planting additional hedgerows (see the project between FWAG, Environment Agency, Moorland Farm (Woodmancote) & local volunteers (23/1/21) to slow down rainfall and water run-off from upper farmland into water courses. As well as where possible re-instating and thickening hedging along boundaries. The added benefit is it reduces nutrient run off also. See The Woodland Trust's Stemming The Flow paper; https://www.woodlandtrust.org.uk/media/1794/stemming-the-flow-trees-in-flood-protection.pdf?fbclid=IwAR30HTrId3-q3V-ZdJ3ujIqbbvpl0hK4KH5tCv2GsZu7oAN43I6G0xm8jDU

Examples of this type of work have already been undertaken by FWAG on the upper stretches of the river Coln and by Gloucestershire Wildlife Trust at Snows Farm Nature Reserve. The National Trust works in partnership with the water and environment agencies in other parts of the country that have proved effective, and there are plenty of other examples that exist around the country.

Other methods suggested included:

- Further discussions and information sharing with landowners along the Churn in terms of infrastructure on their land (mills, sluice gates) that affect flow.
- Creating winter pumping and storage points for farmers on uplands that can be used for crops in the summer, and/or at the key allotment sites along the river;
- Dredging water courses within Cirencester;
- Winter cropping on upper farmland;
- Build and improve our Sustainable Urban Drainage Systems in Cirencester at our homes, and in our streets: putting in more water butts and slow leaching storage, and 'rain gardens'- more permeable surfaces, especially around sites of trees; planting more trees.
- Beavers in upper Churn, who would self-manage the water flow and levels. (This might be a longer term solution).

Hydroelectricity?
Another idea muted: is there an opportunity to harvest energy from the river, as Cirencester did in its past from its mills? At some key sites, for example Gloucester Road sluices, there are constant good levels of flow. Would these be consistent enough to consider installing micro-hydro units? See Whitby Esk hydroelectric turbine project as an example, https://whitbyeskenergy.org.uk/background/the-project/

- **Tackling ground water flooding:** The Oolite Aquifer gravel beds under the Cotswolds. Many of the solutions currently involve diverting road water to rivers, and sewers, and river water into nearby water meadows, and creating new meadow diversions. The problem with this is it does nothing to keep down the ground water levels, if anything it exacerbates them. Pumping out and storing more water from the bore holes at Perrots Brook during the winter might help alleviate ground water flooding? Creating and pumping into lakes above the Whiteway area or increase the reservoir above Stratton, some of which could be used for crops may be another idea. Or another proposal may be to create impermeable water catchment points around the Churn, that could be used to catch excess water once it rises above a flood alert level. Which could then be re-used under drought conditions during the spring & summer periods. Clay bottom (impermeable) lakes or mill ponds could be constructed at different locations: next to the swimming pool; perhaps on the water meadow between the Texaco Garage and Barton Lane; &/or within parts of the Stratton meadows; &/or Daglingworth Stream above Stratton. Can we create new habitats eligible for biodiversity subsidy? It's understood past research focussed on a large expensive 'Stratton reservoir', however would smaller mill-ponds be less costly, more effective and achievable? It was felt that investigations into these types of strategies in the past may have been dismissed due being too large, or too costly. However individuals who work in this field felt that the estimates obtained weren't realistic and the work could be done for less.
- **New developments and town plans:** Major attention also needs to be given to new developments in planning and their potential contribution to the sewer issues, as well as contribution to increasing ground water levels in the area.

What residents can do

Some of the measures needed to tackle Cirencester ongoing flooding issues will take time, especially overcoming sewer problems in the town, or creating natural defences upstream. However there are some measures that if done collectively could have an impact now on how often and how severely Cirencester floods. It's about creating personal flood resilience and reducing the amount of water that enters and moves through the area, be it rain, ground, or sewer water.

How to protect your home from flooding. Here's a YouTube clip taken from a couple in Oxford who've learnt to adapt their property to cope with regular flooding, https://www.youtube.com/watch?v=7qot6tyxFMU&fbclid=IwAR38jXmI_sVzDtZrZPWrUJ7ORyP7IoAiiG2QQ7qihgRf-TVfbjxOFo_5a2E

Flood Mitigation Tips: These are things we have the power to do to help mitigate flooding around Cirencester, whilst waiting for authorities and agencies to play their part:

1. **Harvest rainwater using water butts,**

If you have the available space you can fit one or more water butts to downpipes around your property. For mitigating flood risk the key strategy is to empty them in periods of no rain during the rainy season so they can fill up again when it does rain. This then contributes to the flooding resilience of the neighbourhood by slowing down the amount of water entering the sewage system, or adding to the ground water level, which is especially important during storms. If enough of us do it, this could make significant difference. The other great thing is it then saves money by using less water from hosepipes over the summer. You could also fit an overflow pipe at the top of the water butt that then flows into other containers or onto gravel or grass.

Rainwater Impeding System: If you're feeling resourceful you can even turn a water butt into a Sustainable Urban Drainage system and impede rainwater flow by adding rocks inside the bottom of your water butt, and then gravel. and leave the bottom tap open. Rainwater coming off your roof, then has to travel through a gravel-bed effectively before exiting to the ground. You could even get creative and pot up plants or herbs in the top if you like.

Water butts come in various sizes. Wickes seem to do the cheapest single 100L ones at the moment, at around £20 for the entire Kit. https://www.wickes.co.uk/Wickes-Compact-Water.../p/189593

If you wish to buy several or larger ones, you could try somewhere online like, 'www.getcomposting.com' who do a 200L for about £33 made from recycled plastic. You can also get more decorative ones or ones that double up as planters.

2. **Water saving devices** for the home

There are devices we can install around the home to essentially reduce the amount of water that leaves our homes. It also means you save money on your water bills.

Thames Water used to give some out free to customers, but the link is not easy to find, so here it is:

https://watersavingdevices.thameswater.co.uk/

You can also 'google' for alternative suppliers and devices.

Water efficient shower heads or ShowerSave (water flow regulator/limiter). Which option you choose depends on your set up, but essentially these reduce the flow of water from your shower, which I know isn't everyone's cup of tea, but it does make a difference.

You can also get **water flow regulators for taps** around your home. See the Thames Water weblink above.

Toilet Hippo (other tradenames are available)

This is a bag or device that you put into the cistern of your toilet. It reduces the amount of water that's used in each flush. Different devices are suitable for different types of toilets so be careful to ensure you read up & choose the right one. Use the Thames Water link above, for their version or find out more here,

https://www.hippo-the-watersaver.co.uk/forthehome.html

3. Community Flood Watch

(Environment Agency incident reporting line number: **0800 80 70 60**)

a) Checking for blockages, and other issues: Ok so this one's a little different. Whilst we're all in lockdown, stuck at home, we can get out and exercise 'locally'. If you fancy playing your part in helping Cirencester, Siddington, South Cerney, and other local areas suffer less flooding, there are things we can do. We can walk along water courses in our area, and find out where trash screens, overflow outlets, bridges, pipes, sluices and weirs are located (links to maps below that might prove useful). Then if you see anything that looks amiss, causing blockages or other issues, report it! We can also keep our eye on other water courses that flow into the Churn, such as the Daglingworth Stream, water meadows, etc. Trust your instincts and notice what feels unusual, especially at times of high rainfall.

You can contact the **Environment Agency** incident reporting line number: **0800 80 70 60**.

Take photos and log it: a lot of the recent and past flooding has been posted on Churn Catchment Flood Prevention Group's Facebook page: **https://www.facebook.com/groups/412462082197472**

To keep a timeline, it can be helpful to post where photos are taken and at what time, date etc.

If you are into maps, these might help give you insight into our waterways,

https://maps.bristol.gov.uk/kyp/?edition=glos (you can move the map to your area)

https://riverlevels.uk/rivers/river-churn#.YALTjej7RPZ

b) Monitoring local water levels:

We may not be able to easily get out and about (or not always want to). Something you can do from the comfort of your own home is to check our local water levels, and get prepared. Especially around the times we get lots of rainfall & storms blowing through. There are three levels that can be looked at: 'Rain', 'River' and 'Ground' water.

River Levels,

https://flood-warning-information.service.gov.uk/.../7015... st 5 days. It's taken from a monitoring station in the allotments, next to Abbey Way

The Environment Agency supplies the river levels for the Churn from this link above for the la (A417) and Bowling Green Lane. There is a link for other monitoring stations further downstream, but there appear to be none upstream. **0.7m** and above is the local level where flooding becomes possible. It often reaches this around December/January in most years.

You can also sign up for alerts if you are in an area that is at flood risk at, https://www.gov.uk/sign-up-for-flood-warnings

You can also monitor rivers @ https://riverlevels.uk/levels/gloucestershire#.YALa1-j7RPY

There's also this site, which lets you check rain & ground water levels as well as river,

https://www.gaugemap.co.uk/#!Map

Enter your postcode, and zoom in to your area. The different coloured pins indicate different monitoring stations and on the left you can scroll down to choose Water, Ground or Rain figures, you can also click on graph options to change the date range.

Rainwater Gauges:

https://www.gaugemap.co.uk/#!Map

Rapsgate R36, near Woodmancote and Rendcombe, feeds into the Churn

Shorncote, R09, (near South Cerney)

Miserden, feeds into the Frome and through Sapperton

Feeling inspired, you can even make your own rain gauge (link at bottom).

Groundwater: Monitoring stations at Whiteway, Harebushes, Ampney Crucis, & Siddington

https://www.gaugemap.co.uk/#!Map

The Well at Barton Lane Allotments is also checked regularly for Groundwater levels, see https://gumstool.org.uk/barton-well-monitorinng/ (Thanks to Friends of Gumstool Brook for details)

How to make your own rain gauge (link) https://www.nts.org.uk/.../how-to-make-your-own-rain...

4. **Nature's way**

Another way we can make a difference is by working with nature. Are there surfaces in your garden or on your drive that could be altered from impermeable to permeable?

Could the odd slab be lifted and replaced with gravel, slate chippings, pebbles, or plants? Planning to have driveway work done, consider other options other than asphalt.

Plant a tree? A tree in your garden won't suck up much water in winter, but research has shown that trees can reduce surface water runoff (see Woodland Trust link below). You also get the added benefit of more birds & wildlife, and its scientifically proven trees make you happier.

https://greatergood.berkeley.edu/.../why_trees_can_make...

https://www.woodlandtrust.org.uk/.../stemming-the-flow...

Issues to consider.

- Measures to tackle flooding in the past have been going on, so why does the problem still exist? Maybe the problem lies with this being an interconnected issue, that the diplomacy, co-operation, & politics may obstruct things. As it stands flooding:

    - Involves a number of authorities (GCC, CDC, CTC, other parish councils, and our MP)
    - Involves a number of agencies (Thames Water, Environment Agency, Electricity Companies, Highways, various emergency services, FWAG and others)
    - Involves residents in different areas; Cirencester, North & South Cerney, Cerney Wick, Siddington, as well as those on other water courses – Fairford, Bourton on the Water.
    - Involves other interested parties; Bathurst Estate, farmers and other landowners upstream of large residential areas.

  It may be with this many parties involved that it is very difficult to get agreement and 'buy in' to want to tackle the issue. This is the kind of problem that needs everyone to work together to resolve. That seems to be the greatest challenge. For example, why should landowners upstream of Cirencester make changes to their land? Why should residents who live uphill from the town centre alter their water usage & discharge? To solve this needs that sense of community spirit and collaboration that has been present during this last year of the Covid pandemic, but it also needs a collective consideration when it comes to the burden of cost. Does there need to be clear benefit to those helping out who aren't directly affected, or are Cotswold residents altruistic enough to not need that?

- Who has the responsibility? Who has ownership of this issue? Who is accountable?
- How are costs met? (grants, co-funding & crowdfunding?)
- Summer droughts on some of the water courses are now common, so how do we balance out water transition, for the benefit of sanitation, water quality, and ecology decline? Also what is the frequency of these events and how is the severity measured against the level of response? Are these last two points indicative of climate change?
- People: volunteers – making it sustainable long-term (having a vested interest); holiday periods – is there cover local enough to respond to emergency situations?
- Potential litigation considerations for damage to property or failure by agencies and authorities to carry out protective measures sufficiently. Duties to tackle flooding, including risks to public health and repeated pollution of waterways. As well as exacerbating risk to life in the middle of a pandemic. Also there are issues over property values, resale, and insurance.
- The psychologically detrimental impact of residents being flooded and the benefits to wellbeing of being part of improving resilience.
- We are still in the midst of the rainy season, what actions can be taken short-term, over the next few months to reduce the likelihood or potential impact of another flood event?
- The Churn Catchment Flood Prevention Group would like to understand what role it can play going forward, in supporting residents, agencies, and authorities in resolving our flooding issues.

- Building work is still going on that will feed into the area's where there were flood issues and thus exacerbate things further. For example, the developments going up around and including Siddington Park, Ranford Villages.

- One final issue, one that kept coming up during the writing of this report, is that some areas of Cirencester, Siddington, and South Cerney are known to be on flood plains, that areas that were previously uninhabited, perhaps should never have been built on. Or that the sheer volume of housing packed into this area now, is too much. If this problem is simply too difficult to solve, then perhaps the authorities responsible need to look at a re-housing program? Maybe this is the cheapest, simplest, easiest option for all parties to consider? Although this clearly is not ideal, would it be simplest to re-locate as many residents as is possible out of the flood zone, and literally move them to higher ground?

Suggested Reading & further information

- **Learning lessons from the 2007 floods**, An independent review by Sir Michael Pitt http://www.coulthard.org.uk/hullfloods/Pitts_interim_flood_report_web.pdf

- **Thames Water Drainage Strategy 2019, https://www.thameswater.co.uk/about-us/regulation/drainage-plans** (select 'Latest Reports', 'show 10 more' to access Cirencester)

- **CDC, review & response to the summer 2007 Floods** in the Cotswold district, p80 https://www.cotswold.gov.uk/media/35mln4bi/hyder-report-2007-floods.pdf

- **Pickering Flood Defence Scheme,** https://www.google.com/search?q=pickering+flood+defence+scheme&rlz=1C1CHBF_en-GBGB921GB921&sxsrf=ALeKk02VFxgWoqdX9AqBXXFrDHj67GoyrA:1611306886149&tbm=isch&source=iu&ictx=1&fir=lD9KtTRTf3-UpM%252CxhzbemhaAK50kM%252C_&vet=1&usg=AI4_-kQ80FbS9VYit-w5vxuCh5JWHxflOg&sa=X&ved=2ahUKEwjqlcr0ma_uAhXClFwKHZIND_8Q9QF6BAgJEAE#imgrc=lD9KtTRTf3-UpM

- **Smarter flood risk management in England**, https://static1.squarespace.com/static/595ca91bebbd1a1d0aaab285/t/5a996af524a6942a72f0308c/1520003837227/Smarter_Flood_Risk_Management_2017.pdf

- **Micro-Hydroelectric Power** and the Historic Environment,

https://historicengland.org.uk/images-books/publications/micro-hydroelectric-power-and-historic-environment/micro-hydroelectric-power/

- **River map**: a good online map to check water courses around & into Cirencester can be found here: https://riverlevels.uk/rivers/river-churn#.X_xzaOj7RPY

- **Landscape characteristics** led by Natural England, NCA Profile:107. Cotswolds (NE420) http://publications.naturalengland.org.uk/publication/5900626?category=587130

- **Topography** of the surrounding area, with sections showing the location of **Cirencester**:

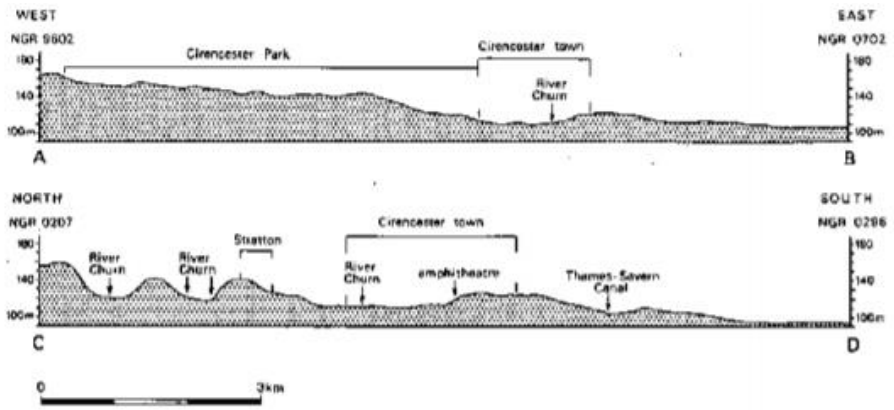
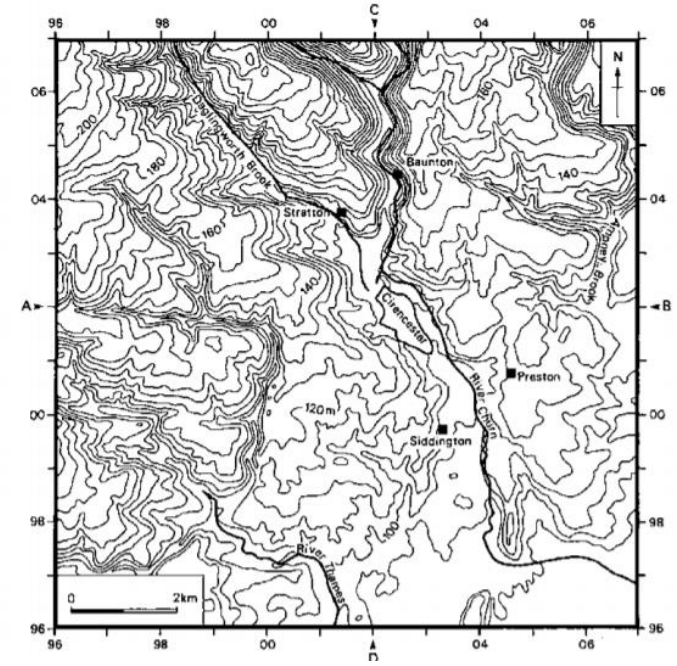


Figure 6
Topography of the surrounding area, with sections showing the location of Cirencester



Source: http://www.cotswoldarchaeology.co.uk/wp-content/uploads/2011/07/Cirencester_Town__Landscape_1st-half.pdf p41.

- **Borehole, Ampney Crucis,** https://www2.bgs.ac.uk/groundwater/datainfo/levels/sites/AmpneyCrucis.html

- **Geology links:**

  http://www.glosgeotrust.org.uk/cots_geology.shtml

  https://cotswoldarchaeology.co.uk/wp-content/uploads/2011/06/Early_Roman_Occupation_at_Cirencester_2_Chpt5.pdf

  BGS map of geology Cirencester: https://webapps.bgs.ac.uk/data/maps/maps.cfc?method=viewRecord&mapId=2039

- Environment Agency, a **guide to monitoring water levels and flows at wetland sites**:

  https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/290440/scho0703bfoi-e-e.pdf

- **Skell Valley Project**, National Trust,

https://www.nationaltrust.org.uk/fountains-abbey-and-studley-royal-water-garden/projects/the-skell-valley-project?fbclid=IwAR1XyO1O7Yhi_kXCM6ovnRyjY9ecSldf2WycA8INwjtiS7KROYTvCS-g9d0

- **Rain gardens** guide:

https://raingardens.info/

Acknowledgements

Christmas 2020 was a horrible end to an already difficult year for many residents of Cirencester, Siddington and South Cerney. The Churn Catchment Flood Prevention Group would like to thank all those that took time out to attend Zoom meetings, share on social media, and send in email correspondence and photos. Thank you also to each person, be it residents, local council members, agency workers, the Church and other organisations and businesses that took time out over Christmas to pull together and help those who were struggling.

It is hoped in some small part that compiling this report expresses some of the experiences of what happened, and people's reflections on the possibilities of 'why'? That it contributes to understanding and learning. May offer some sense of being heard, understanding and take people in some small part from helplessness, back to personal agency. That it demonstrates a desire and willingness to collaborate, and offers some hope and optimism for the future. That it might play some small part in the huge effort currently being undertaken by everyone involved to get to a point where the likelihood of flooding in the Churn Catchment becomes a distant memory. The community would love to appreciate the beautiful waterways we have around us, without living in fear of having our homes overwhelmed by it or risking our health further with sewage emptying into our homes, gardens, streets and parks. Here's to a brighter future living in the beautiful Cotswolds.

Churn Catchment Flood Prevention Group

Appendix

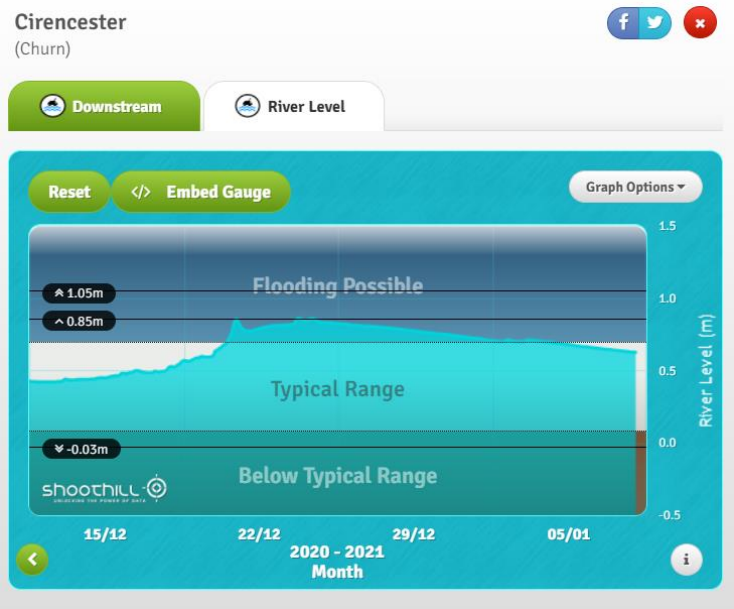
This section contains much of the background information & further details gathered after the flooding.

Data

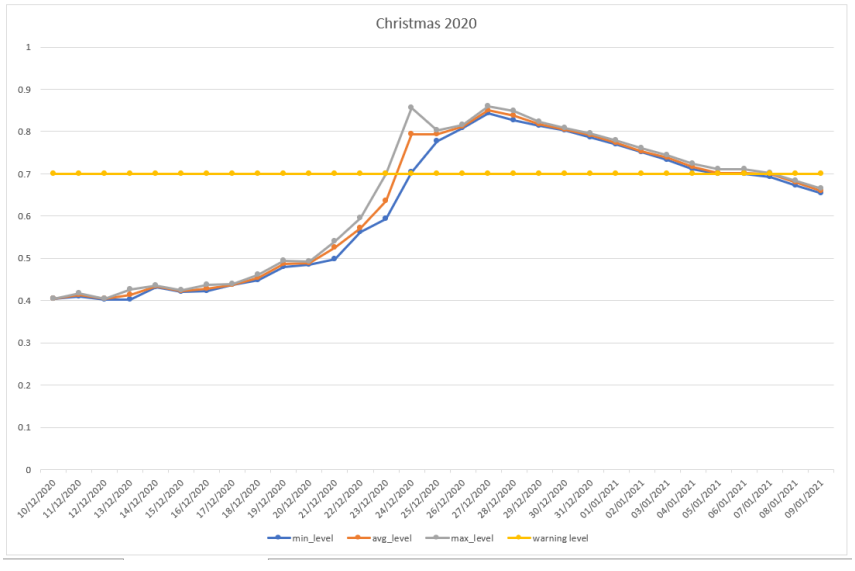
River Levels

Christmas 2020

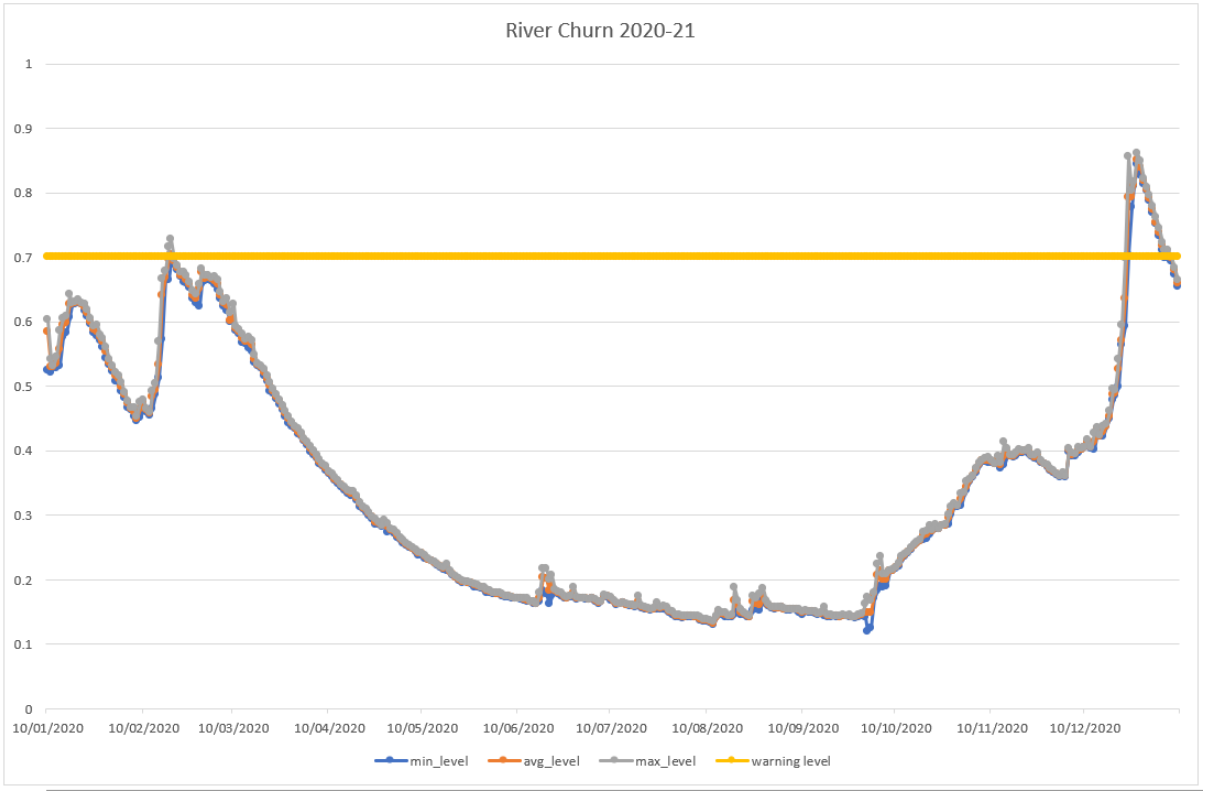
Data taken from https://www.gaugemap.co.uk/#!Map/Summary/757/771/2020-12-11/2021-01-11

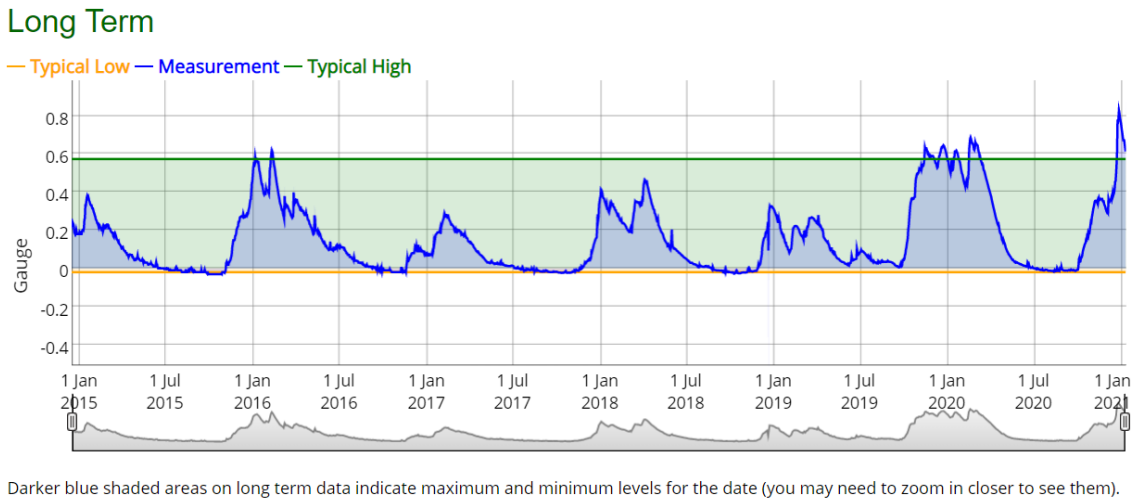


Churn levels at Cirencester data taken from www.riverlevels.uk



2020





Darker blue shaded areas on long term data indicate maximum and minimum levels for the date (you may need to zoom in closer to see them).

https://riverlevels.uk/churn-cirencester-downstream#.X_xsbuj7RPY

River Levels – 2014 – 2020 above 0.7m

Source:

https://riverlevels.uk/churn-cirencester#.X_xuFej7RPY

date	min_level	avg_level	max_level
02/01/2014	0.64	0.65	0.67
03/01/2014	0.65	0.66	0.67
04/01/2014	0.68	0.72	0.74
05/01/2014	0.74	0.75	0.76
06/01/2014	0.77	0.78	0.78
07/01/2014	0.77	0.78	0.8
08/01/2014	0.78	0.78	0.79
09/01/2014	0.79	0.8	0.8
10/01/2014	0.78	0.79	0.79
11/01/2014	0.77	0.77	0.78
12/01/2014	0.76	0.76	0.77
13/01/2014	0.75	0.76	0.89
14/01/2014	0.73	0.74	0.75
15/01/2014	0.73	0.73	0.74
16/01/2014	0.72	0.76	0.88
17/01/2014	0.71	0.71	0.71
18/01/2014	0.7	0.7	0.7
19/01/2014	0.71	0.72	0.72
20/01/2014	0.7	0.71	0.71
21/01/2014	0.71	0.71	0.72
22/01/2014	0.72	0.72	0.72
23/01/2014	0.68	0.7	0.71
24/01/2014	0.67	0.68	0.69
25/01/2014	0.68	0.68	0.68
26/01/2014	0.67	0.67	0.68
27/01/2014	0.68	0.68	0.68
28/01/2014	0.69	0.69	0.7
29/01/2014	0.7	0.7	0.71
30/01/2014	0.7	0.7	0.7
31/01/2014	0.69	0.72	0.73
01/02/2014	0.72	0.73	0.74
02/02/2014	0.72	0.73	0.73
03/02/2014	0.73	0.73	0.73
04/02/2014	0.73	0.73	0.73
05/02/2014	0.73	0.73	0.74
06/02/2014	0.73	0.74	0.74
07/02/2014	0.75	0.76	0.78
08/02/2014	0.77	0.78	0.78
09/02/2014	0.78	0.79	0.8
10/02/2014	0.79	0.79	0.79
11/02/2014	0.79	0.79	0.8
12/02/2014	0.79	0.79	0.8
13/02/2014	0.79	0.79	0.79
14/02/2014	0.78	0.79	0.8
15/02/2014	0.8	0.82	0.83
16/02/2014	0.81	0.82	0.82
17/02/2014	0.82	0.82	0.83
18/02/2014	0.82	0.83	0.83
19/02/2014	0.81	0.81	0.82

20/02/2014	0.8	0.81	0.81
21/02/2014	0.78	0.78	0.79
22/02/2014	0.75	0.76	0.77
23/02/2014	0.73	0.75	0.75
24/02/2014	0.71	0.72	0.73
25/02/2014	0.7	0.7	0.71
26/02/2014	0.67	0.68	0.69

date	min_level	avg_level	max_level
26/11/2012	0.77	0.78	0.78
27/11/2012	0.78	0.78	0.78
28/11/2012	0.76	0.77	0.78
29/11/2012	0.73	0.74	0.75
30/11/2012	0.72	0.73	0.74
01/12/2012	0.7	0.7	0.71
02/12/2012	0.68	0.68	0.68
03/12/2012	0.66	0.67	0.69
04/12/2012	0.63	0.64	0.65
05/12/2012	0.61	0.61	0.62
06/12/2012	0.6	0.6	0.6
07/12/2012	0.58	0.59	0.6
08/12/2012	0.56	0.57	0.58
09/12/2012	0.55	0.56	0.57
10/12/2012	0.54	0.55	0.55
11/12/2012	0.53	0.54	0.54
12/12/2012	0.53	0.53	0.53
13/12/2012	0.52	0.52	0.52
14/12/2012	0.51	0.52	0.53
15/12/2012	0.52	0.53	0.53
19/12/2012	0.51	0.52	0.53
20/12/2012	0.53	0.56	0.6
21/12/2012	0.58	0.59	0.6
22/12/2012	0.59	0.65	0.72
23/12/2012	0.72	0.73	0.73
24/12/2012	0.72	0.75	0.79
25/12/2012	0.78	0.79	0.8
26/12/2012	0.8	0.8	0.8
27/12/2012	0.8	0.8	0.81
28/12/2012	0.8	0.8	0.81
29/12/2012	0.79	0.82	0.84
30/12/2012	0.81	0.83	0.85
31/12/2012	0.81	0.82	0.83
01/01/2013	0.81	0.82	0.82
02/01/2013	0.8	0.8	0.81
03/01/2013	0.78	0.79	0.79
04/01/2013	0.75	0.75	0.78

05/01/2013	0.73	0.74	0.75
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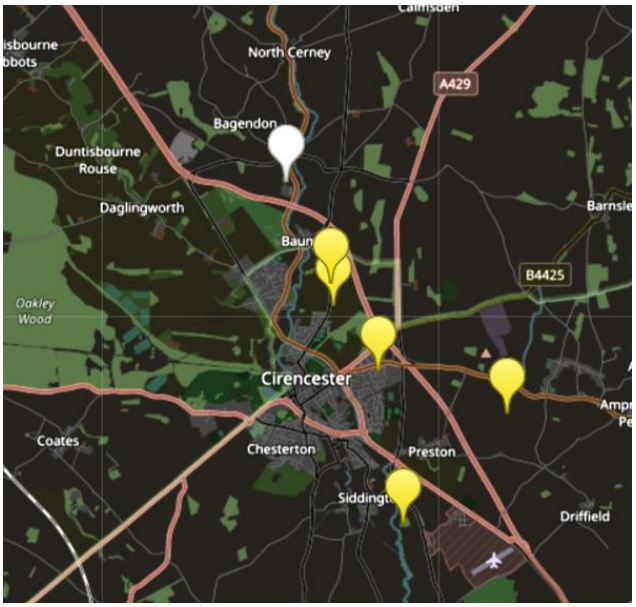
08/01/2013	0.66	0.66	0.67

River map: a good online map to check water courses around and into Cirencester can be found here: https://riverlevels.uk/rivers/river-churn#.X_xzaOj7RPY

Ground Water Levels

Source:
https://www.gaugemap.co.uk/#!Map

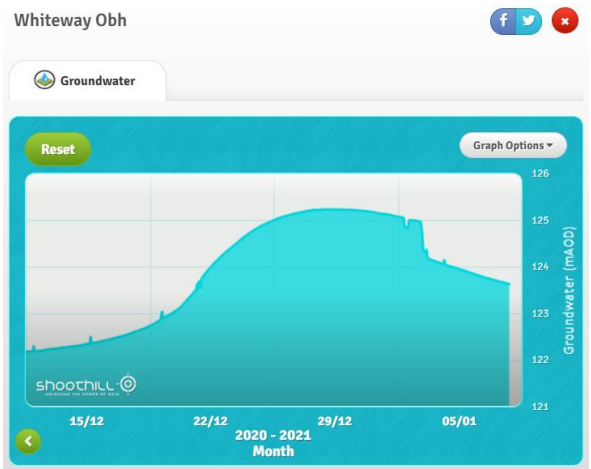
Monitoring stations at Whiteway, Hare-Bushes, Ampney Crucis, and Siddington



Whiteway OBH

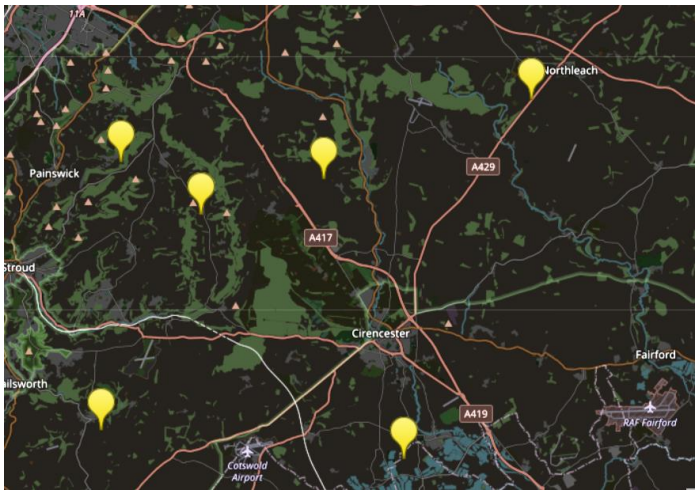
2020 figures:

December 2020:



Rainfall

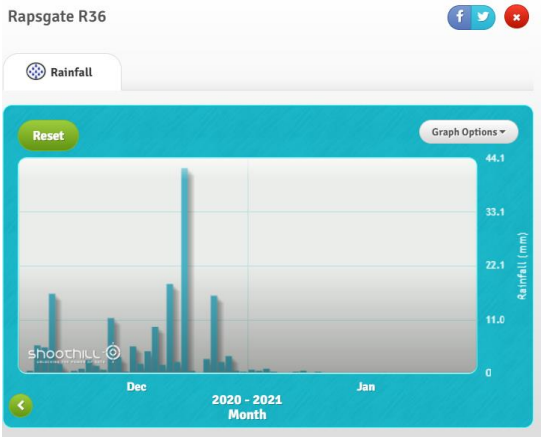
Monitoring stations, https://www.gaugemap.co.uk/#!Map



Rapsgate R36, (near Woodmancote and Rendcombe, feeds into the Churn)

2020 figures:

December 2020: highest level: 42mm 23/12



Miserden, (feeds into the Frome (through Sapperton)

2020 figures:

December 2020: highest level: 45.2mm 23/12

Shorncote, R09, (near South Cerney)

2020 figures:

December 2020: highest level: 20.3 mm 23/12

Flood observations, eye-witness accounts, statements regarding what happened, and when

- It started with reports in Bledington, then Bourton, Slaughters, all river flooding. Then the Churn and Coln river courses. Volume of water compared to 2013/14 ground water and rain levels. It was very localised and specific this time. North Cerney had some flooding in carpark and fields, but no properties. Lack of ability to use toilets.

- 24/12/20: (Around 10 am) Photos posted on social media site (as above). Showing Gumstool Brook has breached and is covering the entire path along Riverside Walk, past the swimming pool. Also flood water photos posted about the same time showing fields flooded (location unknown). (Around 11am) Photos showing high waters at Gloucester Road Sluice, breaching onto the path, on the river link between Texaco and Barton Lane; Barton Lane itself starting to flood (in Abbey Grounds); Water meadow by swimming pool & The Pound full; extensive flooding of Jack Gardner Memorial Gardens with both sewer access covers submerged. (Around 2pm) Extensive flooding images for Spitalgate Lane, Trafalgar Rd, and Gloucester St. (Around 3pm) Siddington, images of flooding in roads, The Common. (Around midnight) Riverside Walk path along swimming pool submerged by several inches.

- 25/12/20: Stratton 20-30cm flooding, bottom of School Hill itself and along Coffin Trail from Barn Way near allotment and bottom of School Hill towards church and towards allotments, and from School Hill out to Bathurst Estate.

- The Mead and swimming pool riverside footpath have never been that high in the past. It travelled through the hole in the wall along the path. Sand-bagging places close to the river. The normal pre-built defences didn't hold it back there.

- Caravan Park between Siddington and Cirencester and Cherry Trees Drive area, many in emergency accommodation.

- Siddington, Boxing Day around The Common, 4-5 ft river flooding.

- Around 100 people affected by sewers this became the main problem. Thames Water response was poor. Sewer inundated by river and fractures and breaks in sewer pipes leading to ground water rising then entering the sewers. We need to know what new things happened, what was different this time. We need more monitoring stations as we don't have enough data.

- Gloucestershire County Council lead on flood issues but in practical ways have passed this down to CDC and to Laurence King, Publica, Lead Officer/Engineer for flooding.

- It is understood Town Council (CTC) and Bathurst Estate followed Memorandum Of Understanding, followed sluice gate guidance, so we need to investigate was this, is this, still the right strategy?

- There is an understanding that different landowners in different areas along the water course who own property with old mill infrastructure, sluice gates etc. on their land, but aren't aware of, or managing in the necessary way. Due to lack of knowledge perhaps?

- City Bank and Willows – sewage problems, some ground water coming up. portaloo brought in by local resident Andy Brown. Stream flowing over bridge, trunk restricting flow beneath.
- Sewage coming up in garden in Blake Road
- Powell's School – trash screens cleared. Fields outside flooded more than usual, automatic building flood defences deployed. School has been flooded so will need to delay opening until Wednesday at the earliest.
- St Peter's Road had flooded basements which is unusual.
- Harry Hare's basement flooded and in Market Place they were also pumping out the Church Crypt.
- Barton Lane end of Cirencester Park flooded
- Town Council building had basement flooding too.
- Melmore Gardens – surcharge of gully. Not much localised rain in comparison to previous events. This was not flash flooding but the system was overloaded.
- Thomas and Dollar St don't normally flood overground but ground water does flood basements. This year levels were at least 6 inches higher than previous high.
- Basement flooding in Victoria Road, Coxwell Street
- Spittlegate area – trunks/logs battering against lintles. Why are they reaching town from upstream?
- Sodden fields, dry summer but wet since October. Are there measurements? Gumstool.org.uk praised.
- Daglingworth Stream North of and through Stratton much higher than normal.
- Stratton Water meadows and adjacent Bathurst Estate fields, south of Stratton fuller than usual.
- Blake Road, Hereward Road. Tankers there to deal with sewage. Problem well known to Thames Water. A second tanker would have helped with under capacity.
- Of the 3 Churn flows the one closest to Grove Lane seemed less than usual while the other two flows were higher.
- Drain on Riverside Walk blocked by tree
- The Mead was flooded on both sides, both from Churn overflow and groundwater. Higher water levels than 2007.
- For much of the 27th, A419 Northbound carriageway (Swindon Rd) adjacent to Tesco/ McDonalds was closed due to flooding.
- Houses at the back of Tesco in Chesterton had issues with sewers backing up.
- Siddington flooded: Is Churn silted up downstream? Is water able to flow away fast enough?
- There are lots of unnatural groundworks under Cirencester.
- High ground water levels and Churn breach at Jack Gardner Memorial Gardens flowed into the sewer at two access pipes locations.
- Flooding between Duntisbourne and Daglingworth reported, along with very strong flows in the watercourses. Some houses affected in Daglingworth by flooding.
- Questions around a canal that used to exist running along by Waitrose and Cheap St, which used to exit to Siddington.
- South Cerney: Churn in the middle of the village was ok. Most issues came from sewer flooding and Shire ditch, west of the village. Overspill from fields west. On Glos/Wilts border, takes outflow from Shorncote sewage works form Cirencester & Preston. Then taken off to the Thames. Main issue has been sewer flooding for a number of years.

Challenges with: Thames Water, 70's infrastructure, susceptible to ground water infiltration. Now they have started lining work on the worst affected areas. This year the new Redrow houses affected for the first time (shifted the problem along?). Now installed an overland pumping station as a temporary solution. Some questions around the weir in South Cerney; who owns and maintains it?

- Hoburne Cotswold Holiday Park Cotswold Water Park: – it then came in at the highest part of the park from South Cerney. South Cerney: After speaking with members of our team that have been located in the area for 20 years and have never experienced anything like this. We were battling a continuous flow of water from a fishing lake between ourselves and the South Cerney Industrial Estate all day (26-27th Dec), which has breached the banks. The water has filled up all 4 of our own lakes and the last one is now ready to burst onto the spine road area around the cross roads with Broadway Lane. While I've managed to get everyone out of immediate danger on site, my concern is where this large amount of water is going to go when it starts to leave our park and whether any homes/business's further down its course can have a little bit of notice to prepare.

- Hoburne Park: Also people trying to turn around on spine road due to road closure, is dangerous. If we'd been asked, a turnaround point could have been set up at the entrance to our park, much safer.

- The Mead: 2007 was our worst experience previously, this was worse than that. Houses not flooded, but we were marooned. Most of it has gone now. Debate as to whether this was ground water or river. Around 5pm the levels suddenly dropped what happened? (Further discussion about Barton Mill outflow being unblocked at this time once EA alerted by resident.)

- The flooding was higher in the picnic area next to Aldi and Tesco than in Kingshill Meadow Country Park. Is there a linking pipe, and was that blocked, contributing to more flooding in Siddington and beyond?

- Some residents felt an emergency plan wasn't well executed, or communicated, and wondered if there was a better strategy?
- Flooding occurred in Baunton (minor); south end of Stratton - some basements? (Unconfirmed); Daglingworth (unconfirmed); and major: Central Cirencester; by Tesco; in Siddington; South Cerney; and the Water Park. No flooding occurred in Chesterton, Bowling Green, Upper or Mid Stratton, and North Cerney, or Rendcomb, although river levels were high.
- No reports of issues in other villages North of Cirencester: Along River Valley: Perrots Brook; North Cerney; Rendcomb; Marsden; Colesbourne; Cowley; Cockleford; Coberley. Or above valley: Duntisbourne (Middle or Rouse); Bagendon; Woodmancote; Rapsgate; Hilcote; Withington; Elkstone; Stockwell; Upper Coberley; Ullenwood.

- Problem with getting through on numbers for people, and quality of information once did get through.

- Issues with sandbags how and where they were used. People taking them to protect garages and not just main buildings. Not understanding how useful they can be at the original locations and how impractical they can be when sodden.
- Deep concerns over behaviour of drivers and traffic management. Some drivers ignoring road closures, or driving too fast. Cars creating bow waves and flooding houses that way. Some of the road closures were poorly thought-out, poorly managed. Explained due to different agencies, responsible for different road closures, agree made it very difficult.
- Arch under barracks was dry so is the water backing up under Sheep Street?
- Waitrose car park not flooded – have they got a soakaway?
- Escott Road (near Abbey Grounds) particularly suffered. 2 houses were evacuated. SEE still has an emergency generator there. SEE responded very quickly ensuring emergency power was on site at Abbey Grounds. Estcote and Dugdale Roads on the Abbey Estate were also flooded to the point that 4 houses had to be evacuated - also an electricity substation on the corner of these roads had flood water around it so had to be closed down and 2 generators supplied for the area. The generators are still in place today with the substation not functioning. I think both overflowing road drains and foul sewer surcharging were responsible for this area flooding.
- Cherry Tree Drive and Southmead were flooded, with reports of having to wade through 2 feet of sewage water.

- **Cherry Tree Drive**, (Extracted from information supplied by Brian Barnes) background:

  There have been ongoing problems with groundwater flooding and sewage leakage for many years. Year 2000 was memorable for flooding with most of the properties adjacent to Tesco having their gardens flooded and joined by sewage from lifted manholes, overloaded with surface water (photographic evidence available). Some houses were flooded with sewage at this time. One resident moving into Cherry Tree Drive in 2005, has experienced some flooding every winter, making part of their property a "no-go" area. The summer of 2007, of course was particularly bad, as was most of Gloucestershire.

  Although surrounded like a moat, the water just stopped as it reached the door sills (photos available). The flooding is mainly from two sewer manholes at the rear of the property. Both manholes lift like a relief valve when the sewers are full and the sewerage flows out like a stream down the garden. In these conditions, the main sewer under Cherry Tree Drive also relieves itself by lifting the manhole covers in the road or more commonly, by spurting jets like a fountain about 300mm high and flows down the road into the nearest road drain - or down residents drives and into their properties! None of this is acceptable. Every time this happens, Thames Water's response is to barricade off the manholes and when the flow subsides, send in a clean-up crew.

  In the lead up to Christmas 2012, gardens became waterlogged, as the ground was saturated with rainfall. By Christmas Eve, the sewers were no longer coping and sewage was spilling out into the Road and gardens. It was also coming from Tesco's carpark. By New Year's Day flooding rescinded in gardens and on the road, however sewage was still coming from the manholes. It took until July 2013 for Thames Water to complete clean-up and repair works needed.

  18th February 2019 – sewage again dispensing from drains the gardens of a property; road drains seemed to cope this time.

  December 2020, Storm Alex in October, saturated ground levels, then a cold dry spell, followed by more heavy rainfall in November into December. 23rd December potential flood

warning notification from EA. Ground water flooding in garden already present, also the main sewer drains in Cherry Tree Road were discharging. Christmas Eve, 3 properties lost gas supply, a gas leak was found, and the teams working to repair it through Christmas Day had problems with the holes constantly filing with ground water. 26th December EA flood warning danger to property, and that night Storm Bella came in. Flood water surrounded some properties, luckily it did not enter. Thames Water was contacted on the 29th and a clean-up team responded. Staff came again on the 15th January 2021. Followed by a visit from Denise Kinsella, from Thames Water Reading, who looks after our area.

- **Wildwood Park Home Estate December 2020**

  The entrance to the park home estate is off Cherry Tree Drive.
  Over the Christmas period, with the rise in floodwater entering the main sewer, the pumping stations in Wildwood just couldn't cope as the main sewer were full. Thames Water contacted the new owners of the Estate and agreed to stop the pumps and residents were not allowed to use their toilets, baths etc. Cotswold District Council arranged to provide Porta-loos to the residents as a stop-gap measure with the option they could move into a hotel (Premier Inn) if they preferred. Later, the new site owners provided a tanker to take away the waste and later Thames Water provided tankerage too, allowing residents to use their toilets again without having to endure to cold outside in the Porta-loos. This worked very well and was already a proven procedure like the one in existence for Blake Road/Eskdale Road area. Wildwood was allowed to restart the pumps when the main sewer level dropped and the tanker service removed early January 2021.

- **Siddington Village**: several dwellings in The Common were flooded and residents moved out.

- Victoria Road, one house on The Talbot side of the road cellar was flooded and pumping out into the road.
- Thomas Street, one cellar flooded (this happens quite often) but this time no flooding at the junction of Thomas Street and Dollar Street.
- Watermoor Road not flooded but work has been completed at Kwik-Fit which seems to have worked.

SEWAGE INCIDENTS - A case study, (Extracted from information supplied by Christopher Arnold)

SPILLS AT BLAKE AND HEREWARD ROADS, CIRENCESTER SINCE 2012. – what lessons can be learned?

- Nov 2012- Feb 2013. Sewage surfacing incidents with a subsequent construction of reserve pit and penstock valve to control any future severe sewage spills.



- Jan 2014 - March 14 Sewage being pumped in the Abbey Grounds with just hay bales for 'purification'.

- Jan - Feb 2016 - Mobile sewage plant installed so treated (to a certain extent) sewage could be pumped in to the river.


- May 2016 - Flood volume light and short-lived.
- Jan 2018 - Flood moderate sewage spills.
- May 2018 - Flood moderate sewage spills.

- Nov 2019 - Feb 20 - Flood and sewage spill severe and protracted. Hence need for pumps and tankers to clear penstock valve pit which stubbornly remained full of sewage.

- Dec 2020 - Jan 21 - Flood and sewage spill severe. Many sewage drains are discharging sewage on to roads, parks and pathways.

(Right) Sewer drain on Trafalgar Rd

(Below Left) Sewer water and children's playground Abbey Grounds.

(Below Right) Sewer drain under river water, Jack Gardner Memorial Gardens

- As on all previous occasions, the reserve pit and penstock valve that was designed to protect us has failed - hence attempts at inserting an air-line for a 'balloon' to assist preventing back flow of sewage. The sewage in the main drain remains at a static very high level indicating that for 2 weeks the sewage system has not been functioning (despite hardly any rain) and all waste is failing to 'get away'.

- AT ALL LEVELS AND ON ALL OCCASIONS, THE SEWAGE SYSTEM HAS PROVED ITSELF UNFIT FOR PURPOSE, DESPITE ENDLESS SURVEYS, INVESTIGATIONS, AND ATTEMPTS AT REMEDIAL WORK. THIS TIME AN EFFECTIVE AND DURABLE SOLUTION MUST BE FOUND. SEWAGE ON OUR STREETS AND PUBLIC PLACES AND FLOODING IN SOME HOMES MUST NO LONGER BE TOLERATED.

NB: Further photos are available on request

Potential underlying causes (recent changes)

Drains and sewer work:

- Road Drain A417 Gloucester Road & Gloucester St junction improvements made this summer (https://goo.gl/maps/BnMgcfxpNzzey6X96). The road drain here feeds into the River Churn, normally it doesn't work very well and the road floods, this year during the flooding the road was relatively clear, despite the water in the meadow being higher than the drain into the river.
- Generators have been pumping out at Abbey Grounds by the gatehouse for a number of years now. Additional tank put into to alleviate pressure on sewer mains in this area. Problems with the valves breaking. No pumping in place this Christmas.
- Sewer main flooded by ground/river water at Jack Gardner Memorial Gardens at two locations.
- Sewer work on Gloucester Road, Stratton (next to Overhill Rd)
- Some work took place by Thames Water on Bathurst Estate next to the Daglingworth Stream, bottom end of Stratton. (https://goo.gl/maps/xntf5f7L18GWPeuL8) Not sure what this connection here is?
- There was a major breach in system at Whiteway/Abbey Way lights a couple of weeks before, is this a contributing factor to ground water levels?
- Thames Water have spent the last few years lining the sewer pipes in Cirencester to stop ground water infiltration, so has this moved the problem on to areas where the pipes haven't been lined?
- The generators & pumps at Abbey Grounds next to the gatehouse hadn't been in operation this year, in previous years, are they normally in operation by now?
- Has there been any flood alleviation work on Cheltenham Road (A435) or A336 (Severn Springs)?
- Thames Water has carried out sewer lining work towards the 'lower – middle' part of Watermoor Rd (may also have impacted connection into Church St and Queen St. As well as doing a lot of work (reason unknown) outside The Nelson on Gloucester St.
- When the river goes above the 'flood line' on the EA website, Thames Water usually send tankers to clear and pump water out of the storm drains on nearby roads (seen in Dollar St mainly), this hasn't happened this year and those drains were near full.

Trash screens, sluice gates & blocked pipes:

- It's important to note, EA will clear blockages once made aware, but they need people to tell them.
- Once the blocked drain (?) on the riverside walk between Gloucester St and Barton Mill was cleared by Environment Agency, flood levels instantly started dropping in Thomas and Dollar St.
- Perrott's Brook – was a sluice gate opened? Was this to save crops?
- Bridge to swimming pool over Gumstool Brook susceptible to blockages due to pipes underneath, cleared often by E.A. Trash screens at Riverside Walk & Powell's School cleared frequently.
- Was there a pipe blocked between Kingshill Meadow and the floodplain/picnic area next to Aldi & Tesco?
- When and which sluice gates were operated in the weeks leading up to and during the flooding?

- Logs in river blocking bridges at City Bank, and Spitalgate Lane
- An 8ft plank and a ladder blocked a pipe in the Daglingworth Stream at the bottom of Stratton next to junction of Cheltenham and Gloucester Rd. Was this caught up in the flood, or put there intentionally to divert water onto the meadows, to reduce further flooding in the centre?
- There is a question as to whether the sluice gate at Gloucester Rd was opened according to the Memorandum of Operation during the flooding (photo available on request). As per the MoU (sections 4.2.1 & 4.2.2), the two green ones should always be fully raised and the flow is controlled by opening the new, larger single leaf sluice (installed after the 2007 floods). Photos show it was shut.
- Also the sluice gate at Gumstool Brook was fully closed (photo evidence from 28th).

Persistent & heavy rainfall?

- River levels: Back in September river levels were at the bottom end of their normal depth, https://www.gaugemap.co.uk/?fbclid=IwAR3TveC1vpcv3GHOl9gzDKHwqnLfiYwFzSuhQLa0_T5O5mAioOFFjkNvYZc#!Map/Summary/757/771/2020-09-24/2020-09-30 (Gumstool Brook had been almost empty for months). Then the week before Xmas they increased persistently into the flood zone.
- Yearly breaching: Last winter, Gumstool Brook breached across the path, at some times the water meadows were almost impassable (high levels). The river also breached at Baunton, at Bowling Green allotments, and Jack Gardner Memorial Gardens.
- Rainfall: https://www.glosweather.com/climate?fbclid=IwAR1h0MerlF7vnmUkCIcv7diKZCAcHn90E0HPvydPjS3Vk98X5kOFDv3RBmc
- https://www.glosweather.com/climate p2, Main info seems to be on page 2. Shows that the monthly total for December was way above average - in fact it could be the wettest month at 176.4 since these records began in 2007. (Go to the site if you want fuller details). The annual rainfall for 2020 is definitely the highest - and by quite a margin - over the last 13 years. So perhaps what has happened is very explicable! I guess the 2 very wet days on December 21 and 23 were the last straw for the Churn!

Tree felling:

- A429 Swindon Road between Barn Theatre and Tesco roundabouts (Ash)
- 2 mature trees have been taken down along Gloucester Road, Stratton, one next to the Daglingworth Stream (https://goo.gl/maps/7CMzEcRxMDsf1yrx8) and the other next to Tinglesfield footpath (https://goo.gl/maps/1zUB7WHHnWbNRhcKA)
- Large section of trees cut down on Cheltenham Road A435 just north or North Cerney (https://goo.gl/maps/LAx8RBjuf9ZiAptj6)
- One of the very large trees in Baunton next to the river came down this year (https://goo.gl/maps/xBCYXgCpCvNxf91K7)

- Horse Chestnut trees felled and replaced by Limes, Bathurst Estate, did this have an affect (Flooding at Barton Lane end of Cirencester Park)?
- Logs in river blocking bridges at City Bank, and Spitalgate Lane
- At the time of writing this report, at least 3 more trees over the age of 100 are currently being felled along the river Churn (reported as dying), at the Cheltenham Road Allotments. Will there be an impact on control of rainwater flowing into the river, and stability of the bank in this area, if these aren't replaced with the right species of tree? Location: https://goo.gl/maps/bebVfsXRDhTN3L3F7

Water course anomalies:

- St Peter's Road floods - was there a problem with the culvert under St Peter's Court? Was the course of the water diverted?
- During January 2020 Waitrose did some massive work on their car park to remedy extensive flooding during heavy rain. This seems to have solved the problem there, but in hindsight we can see that a "small lake" which held water during heavy rainfall and discharged it slowly has been lost. And may have overwhelmed the culvert in St Peter's Road?
- Historical Map of Town, indicates the canal feeder from Hammond Way next to the old train station (since filled in) (at Barton Mill that flooded Dollar St in the 1920's), which runs under Waitrose, close to Sheep St, Ashcroft Rd and St Peter's Rd, along Whitworth Rd, under Trinity and St Michael's Rd, under the dual carriageway, under Midland Rd, Elliot Rd, and into upper Siddington alongside Pound Close and splits just next to the playing field: https://maps.bristol.gov.uk/kyp/?edition=glos

- What were the weir and waterways like in the Abbey Grounds? Park Wardens look after these).
- Daglingworth Stream – new occupiers of buildings, earthworks, and new tree planting by Stratton church

General/other:

- Is there a resilience plan for events like this? Can it be better communicated? Need 54321 countdown to event sort of easy planning tool with actions needed after event · This event happened at Christmas when Town Council were on holiday.
- Any potential impact from new housing estate in North Cerney?
- Are EA currently under-resourced?

MEMORANDUM OF UNDERSTANDING THE FLOW OF THE RIVER THROUGH CIRENCESTER

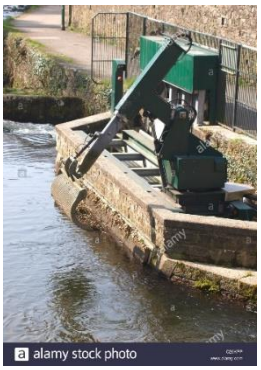
https://static1.squarespace.com/static/563789b6e4b03c7ded1a9ff2/t/5dcabb4de381d24d49fc0427/1573567314578/Memorandum+of+Understanding+Sluice+Gate+Operation+2019+Update+Web+Version.pdf

Links for Memorandum and Appendix

https://cirencester.gov.uk/community-response-latest-news-1

Possible Recommendations

- A working partnership between all relevant bodies. For example, the National Trust have catchment projects elsewhere working with water and environment agencies.
- Have a comprehensive understanding of where we are. It would advantageous to map everything, flow, the history and how the water was used. Who has responsibility for what?
- Flood Action Plan – if not one, then create or improve one [CDC/CTC/Community group]
- Process and Procedures (i.e. 5, 4,3,2,1 day action plans)
- Key responsibilities
- Improve communications between all key parties: the councils, agencies, and residents.
- Look at key responsibilities that lie with those that don't live locally, especially as issues often occur during Christmas holiday period. How can this be improved?
- Information pack for residents (particularly those not on social media) including telephone numbers for Thames Water, Environment Agency, Electricity Company, Council Emergency line.
- Better alert systems, more monitoring points (particularly for ground water levels?) [current sites: Perrot's Brook; Barton Lane Well; Harebushes?] More monitoring of river levels and trash screens (and so requesting Environment Agency clear more frequently): either electronic flow monitors, or CCTV in more points along the water course, or automatic clearing systems. Or using volunteers (more practical/lower cost in short term). This image shows an Automatic Clearing system, Example in Devon.

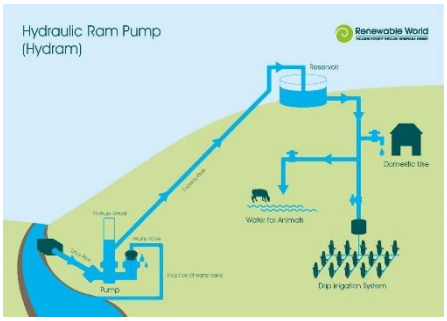


- Volunteer Flood Wardens? To regularly check levels, trash screens, support in flood emergency?
- Ensure it is clearly communicated to all affected parties & interests.

Build in flood resilience:

- Education/discussion/information/involvement with landowners along the Churn with infrastructure that affects flow.
- Want to look at Natural Flood Management. 'Farmers getting paid to grow lakes', so working with FWAG is a good idea.
- The question is was this fluvial (river) water flooding or ground water? Currently the overarching issue seems to be too much rain water repeatedly filling up the Oolite Aquifer and River Churn in a short space of time, over the rainy season (primarily October – April). Many of the solutions currently involve diverting road water to rivers, and sewers, and river water into nearby water meadows, and creating new meadow diversions. The problem with this is it does nothing to keep down ground water levels within Cirencester, if this is the issue, but if anything it exacerbates them. Which then leads to the rivers, sewers, and property being flooded anyhow. If the issue is ground water, then one proposal may be to create impermeable water catchment points around Cirencester, that could be used to catch excess water once it rises above a flood alert level. Which could then be re-used under drought conditions during the spring & summer periods. Pumping out & storing more water from the bore holes at Perrots Brook during winter periods might also help alleviate flooding

These could include: Clay bottom (impermeable) lakes or mill ponds on part of the water meadows and/or at a couple of sites on the Bathurst Estate that currently acts as flood plains – which could be used to restock Gumstool & Daglingworth Brook & the River Churn in the dry months by installing 2-way sluice gates or renewable energy powered pumps or the tried and tested green -technology of 'hydraulic ram pumps' (https://renewable-world.org/our-approach-to-renewable-energy/technologies/hydraulic-ram-pumps-hydram/). If the Bathurst Estate were willing, maybe Clay could be used from their Bund creation contract with Smyths Waste Management.



- Pumping water to lakes or reservoirs created above Whiteway &/or alongside the current one at Stratton, &/or towards Daglingworth that could service crop fields for local farmers
- Communal IBC's or large water stores at allotments at the Cheltenham Rd, Barn Way, Bowling Green Lane, Barton lane, and City Bank could be used, pumping water from the river during the rainy season, to then use on crops during the summer periods.

- If it is more fluvial/river water then create more flood plains using leaky dams, between Severn Springs & North Cerney (work with FWAG) could help control this, as well as making more use of flood plains at the top end of Stratton Meadows as they exit Baunton, and before Stratton on the Daglingworth Stream.

- Plant trees on slopes along upper Churn. Plant or re-instate hedgerow on farmland above the Churn and its tributaries (see the project between FWAG, Environment Agency, Moorland Farm (Woodmancote) and local volunteers (23/1/21)

Although trees don't absorb rainfall in winter, their physicality has the potential to slow down water. The bare canopy & trunk will slow rain falling directly onto the ground and the roots structure allows filtrating down through the soil to spread over a wider area. https://www.woodlandtrust.org.uk/trees-woods-and-wildlife/british-trees/flooding/

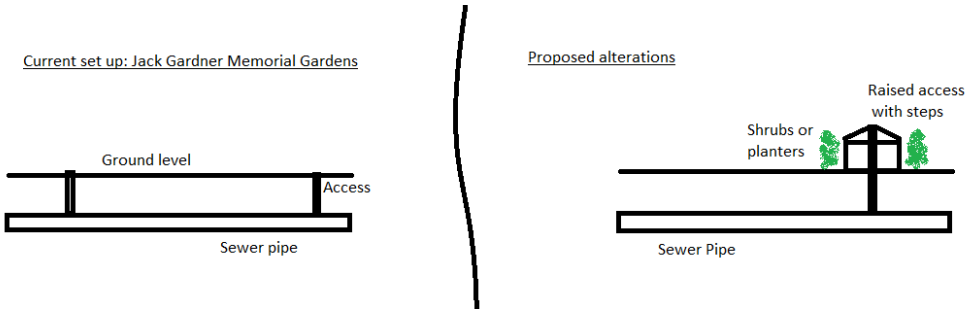
Work with FWAG? Some 50,000 trees are due to be planted on farms in the Cotswolds in early 2021 thanks to FWAG. With Bagendon and Cirencester included on the list (others include: Guiting Power, Cold Aston, Fairford, Bibury and Coleshill). Could there be more opportunities to do this kind of work? There are a growing number of local residents willing to give up their time to help (Lee Evans, Cotswold Biodiversity Network).

- Where the overflow is on Riverside Walk near Texaco, could some screening be constructed to stop the pipe becoming blocked, either using poles & branches, gabions, or fitting a trash screen?
- Dredge water courses within Cirencester?

- Dredge blocked water courses downstream of Cirencester, Siddington, South Cerney, flow in Thames better.
- Beavers in upper Churn, would self-manage the water flow & levels. (Longer term solution?)
- Winter green cropping farmland Upper Churn (work with FWAG?)
- Thames Water – improve sewer security (lining in progress – where is this at now?), especially where it typically breaches (Jack Gardner – could these access hatches be raised, and the land around them raised also?). Work with local residents as below -
- Build/improve SuDS in Cirencester: https://www.susdrain.org/delivering-suds/retrofitting/why-retrofit/why-change.html (retrofitting SuDS - Thames Water)
    - In our homes - from roof's – water butts & mini gravel SuDS (put gravel in water butt, and filter at top, then add soil & plants in top. Connect to downpipe, create outflow to garden); and create green roofs; also water gardens; gravel/brick driveway conversions (whole or part); plant more shrubs and trees in gardens.
    - In our streets – green roof bus shelters and other buildings; create more permeable paving and roads; increase plant and tree planting in areas where there is currently tarmacking, or create water gardens, create more ponds, and dry beds. Or just gravelled/permeable areas (https://www.pavingexpert.com/permabl1) CDC/CTC/Highways

- Tackling sewer flooding, (see Thames Water Drainage plans, Cirencester p21 & p25) https://www.thameswater.co.uk/about-us/regulation/drainage-plans?fbclid=IwAR1h487P6whs3Ls1oZZHn0M1sIAKWfqGrpvlYocbbec9ksVNTcUZvJa0Dl8 Click on 'latest reports', 'show 10 more' to access Cirencester's plan.

  Has the program of de-coupling rainwater from the sewers begun? Can a partnership working with local residents to collaborate in this area help? Do some areas such as Stratton & Bowling Green/Whiteway feed rainwater into the overburdened sewage system in the town? These residents aren't directly affected by flooding, but could support those that do. Putting 'managed' water butts in, creating SuDS from them (see 'what residents can do' section) or creating soakaways.
  Also regarding the sewer access points where river water often overruns in flooding conditions, for example the two in Jack Gardner Memorial Gardens. Can these be built up, 2-3 metres (sufficient to be well out of reach of flood water), with steps & shrubs surrounding to make safe and aesthetically suitable.



Issues/things to consider

1. Warning/alert systems
2. Holiday times (staff availability and cover)
3. Water levels in the Churn this summer were really low (although within usual levels). Gumstool Brook all but dried up. Many of the flood alleviation measure upstream of Cirencester could impact further levels in future summers. Possible solutions to combat this issue might include: a) increasing water into the Churn via residents supply boreholes at Perrots Brook? b) Better management of sluice gates at Gloucester Rd; c) converting run-off onto Bathurst Estate &/or Stratton Water Meadows, so that a portion is converted to clay bottom lake to act as a store (Would Bathurst Estate be willing to use clay from Smyths the contractors they are using for their bunds) with directional switching of gate control in winter and summer.
4. Costs – could be co-funded by key stakeholders as well as crowdfunding from the community.
5. Diplomacy, willingness of other communities, landowners to participate in alleviation work.
6. Community /CDC: issues around responsibility/ownership/accountability need resolving.
7. Volunteers: from experience in Fairford floods, plan was put together with local residents. 15 years on, lot of people are much older, so plan fell by the wayside. Consequently this needs continuous planning and management. **Localism**: suggest possible volunteers as one part of the solution, but also work to putting in measuring and alert equipment longer term? &/or automatic clearing systems?