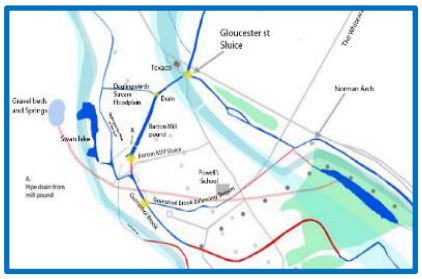


Citizen Monitoring Report

August 2024

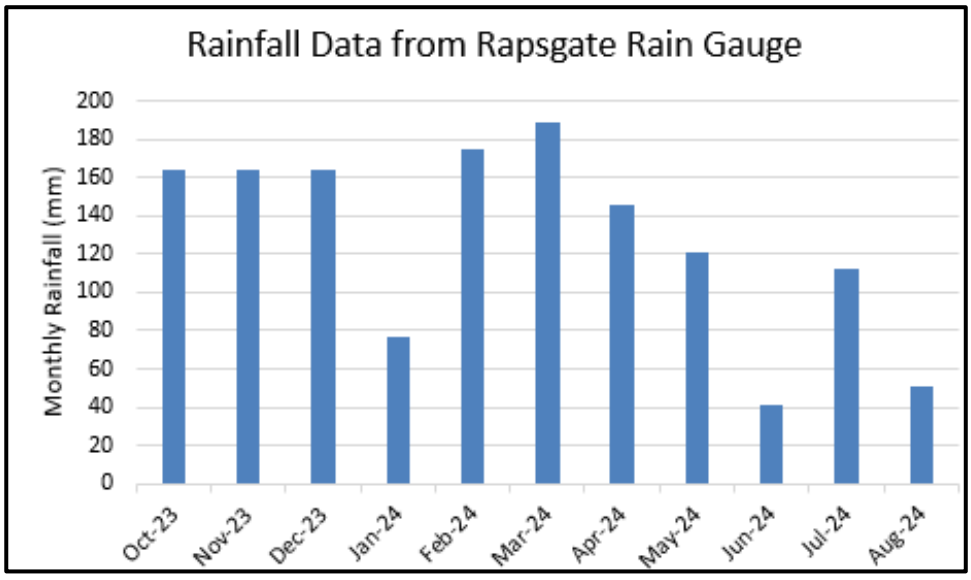
Friends of the Gumstool Brook

Friends of Gumstool Brook is a group of local people interested in Cirencester's Gumstool Brook and its associated streams. Visit our website at https://gumstool.org.uk

1. Summary

- During August there has been 50.9mm of rainfall recorded in the Churn catchment and 53.6mm in the Frome catchment to the west. This equates to just over 80% and almost 75% of their monthly averages, respectively.
- Groundwater in the Cotswold limestone aquifers have returned to normal levels for the time of year following exceptionally high spring levels.
- At the end of August, flow in the River Churn had fallen to 14Ml/day which is a normal flow rate for the summer period. The large sluice gate on the Churn at Gloucester Street remains closed.
- The flow into the Barton Mill Pound from the River Churn has remained at a very low rate, and algae/weed is increasing.
- The Daglingworth Stream in the Duntisbourne area has reduced slightly and is flowing at a 'very low flow' level.
- The Daglingworth Stream continues to cease flowing between 'Stratton End' and 'Barn Way' monitoring locations and is then dry through to Barton Mill, making no contribution to flow in the River Churn.
- Monitoring of river health has been performed for a couple of months, and initial indicators are that the Churn and Gumstool Brook are in a healthy condition.
- Flow through the Abbey Lake appears low but adequate for its ecological health. Further flow monitoring is required to develop this understanding.

2. Weather Update & Water Situation Prognosis



The exceptionally wet spring in the upper Churn and Daglingworth Stream catchments was followed by a much drier start to the summer. In June only about 67% of the average monthly rainfall was recorded at the Environment Agency (EA) rain gauge at Rapsgate in the Churn catchment and around 45% of average at the EA Miserden gauge to the west in the Frome catchment. July was significantly wetter with about

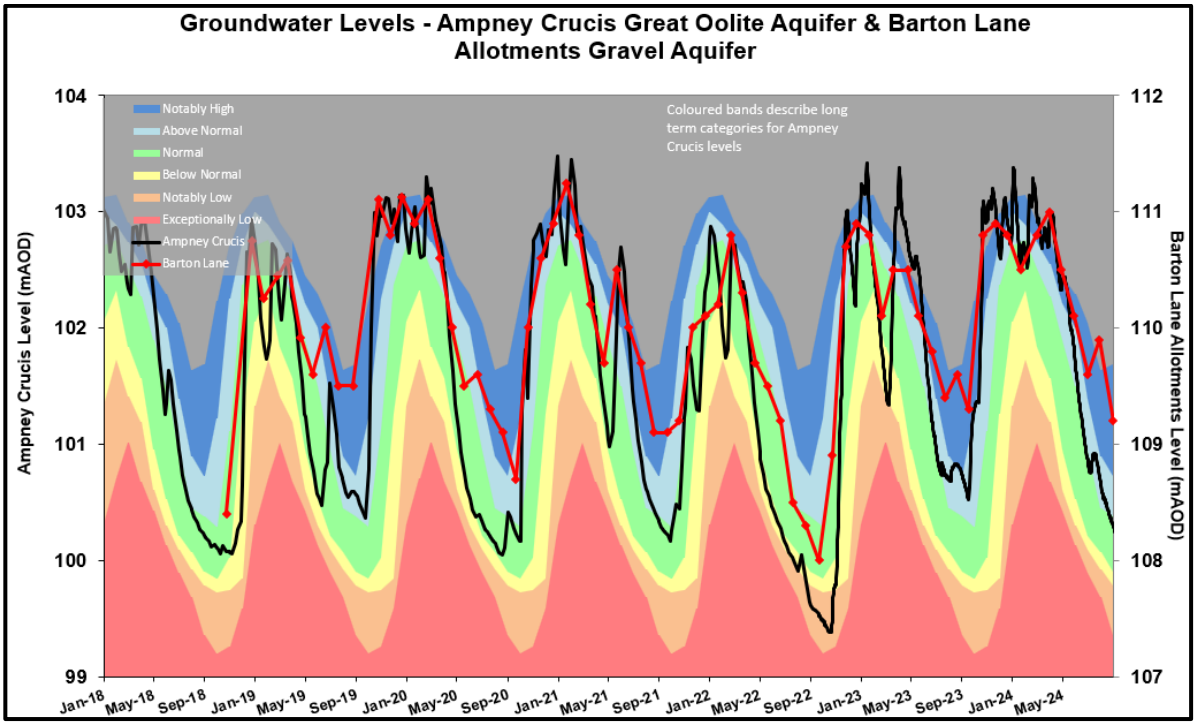
175% of the monthly rainfall recorded at Rapsgate and almost 140% at Miserden, although most of this rain fell on three very wet days during the first two weeks of the month. August has been drier with 50.9mm of rain recorded at Rapsgate and 53.6mm at Miserden, equating to just over 80% and almost 75%, respectively, of the monthly average.

Despite the exceptionally wet winter and spring maintaining a healthy water situation in the upper Churn and Daglingworth Stream catchments, the variable summer rainfall has resulted in a reasonably typical continuing decline of groundwater levels and river flows to normal conditions in August. In addition, also a result of the summer weather, it is of note that soils across much of south east England are also dry. Although this is normal for the time of year, dry soils need to become wet before autumn rainfall can recharge aquifers, causing groundwater levels and river flows to increase.

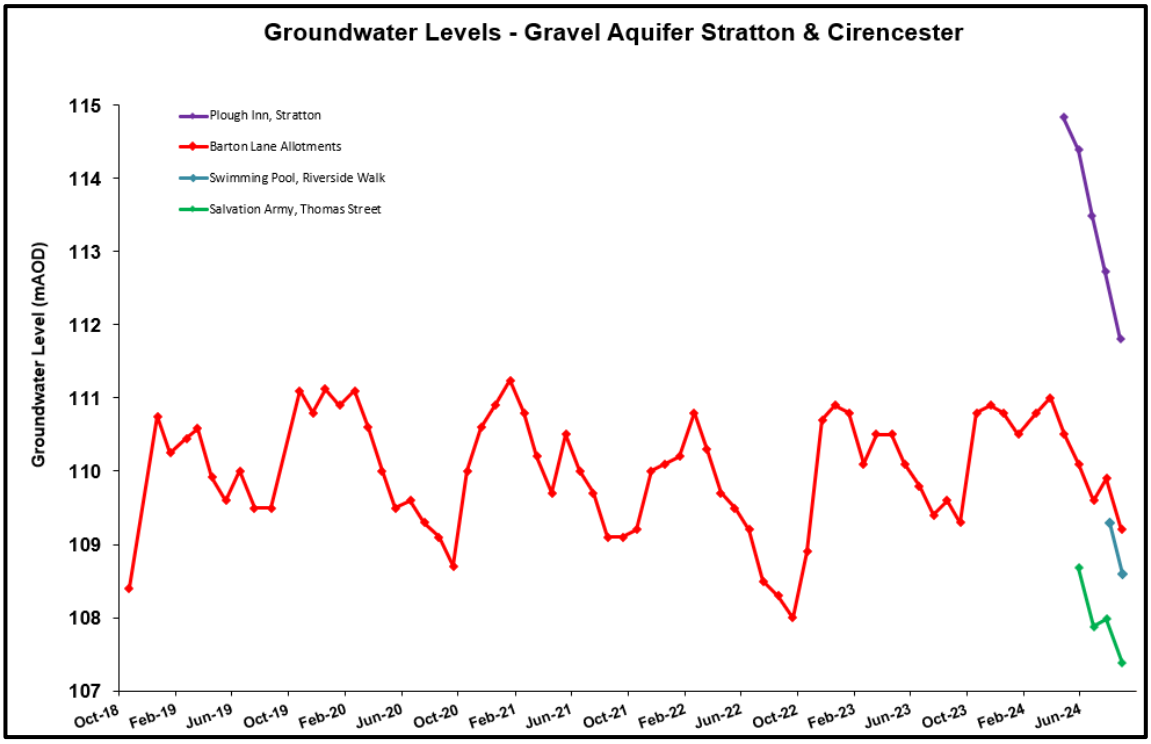
Looking ahead at the weather, the Met Office 3 month outlook from September to November 2024 for the whole UK is that autumn is more likely than usual to be wet, particularly in October and November. The weather is unlikely to be as wet as autumn 2023 with northern parts of the UK having the greatest chance of being wetter than normal. The chance of autumn being warm is also higher than normal although cool spells remain possible, especially later in the season. With the health of Cirencester's waterways always influenced by the weather, the prognosis is for a typical seasonal recovery of flow this autumn, reflecting the weather outlook as well as the normal groundwater levels and river flows at the end of August.

3. Groundwater Situation

As seen on the graph below, groundwater levels in the Great Oolite limestone aquifer fell progressively from Exceptionally High levels in April to Normal levels for the time of year at the end of June, but with the first half of July being particularly wet, the declining trend was interrupted briefly. The usual seasonal decline then recommenced, with groundwater levels at the end of August being Normal for the time of year. As a result, groundwater levels in the Great Oolite are similar to those seen in August 2021 although noticeably higher than in August 2022. The graph also shows that similar groundwater level trends have been observed in the shallow Gravel aquifer at Barton Lane Allotments.



As citizen science has extended to monitoring groundwater levels in the Gravel aquifer using additional wells, similar trends are emerging. This can be seen on the graph below, which shows groundwater levels declining in Stratton and in the northern parts of Cirencester. In these areas, the shallow Gravel aquifer underlies the River Churn and Daglingworth Stream, so continued monitoring is important to help understand the interactions between groundwater and the waterways.



4. Daglingworth Stream & Gumstool Brook Flows

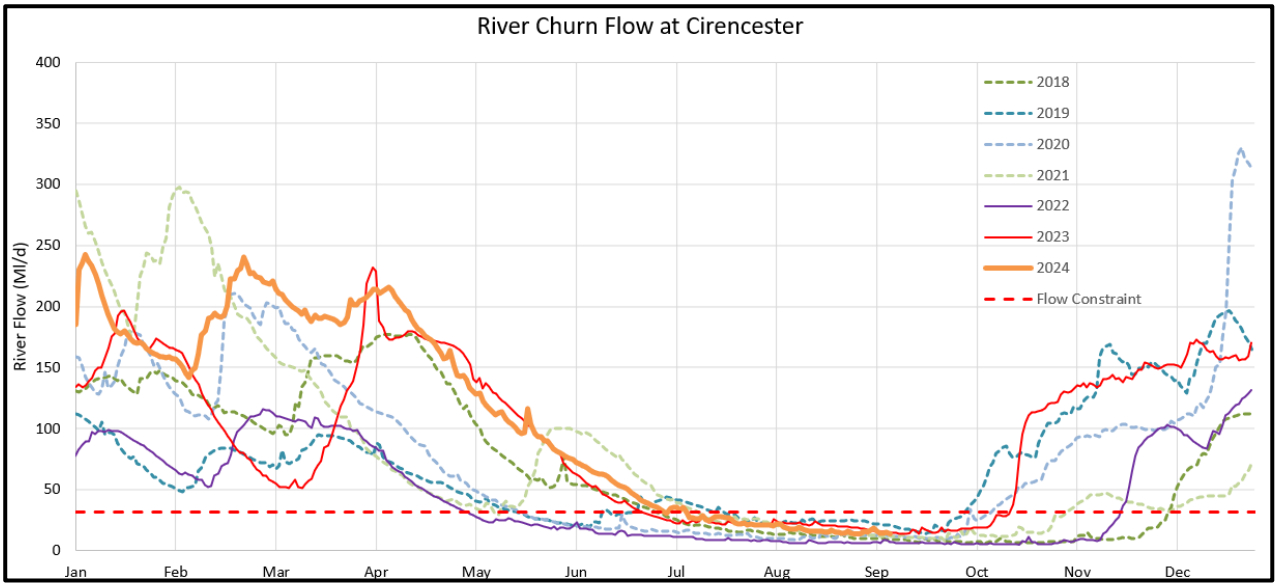
From October 2023 to early June 2024, Great Oolite groundwater levels remained above the proposed trigger for flow in the Gumstool Brook Balancing Stream. This trigger was defined previously based on photographic records of dry stream bed linked to measured groundwater levels. Since 6th June however, groundwater levels have been below this trigger while low flows continued until August when the stream was recorded as dry. Adjustment of the Gloucester Street sluice on 7th June resulted in an increase in water levels in the Barton Mill Pound, and it is possible that this has supported flows into the Daglingworth Stream along Riverside Walk and thus into the Balancing Stream. This requires further evaluation, including ongoing monitoring of stream water depths, as more complex controls on stream flow are suggested.

From the cycles of the Daglingworth Stream flowing then drying up between Daglingworth and Stratton, identified by citizen science photographic observations, a relationship between groundwater fluctuations in the Great Oolite aquifer and stream flow has been inferred. As reported previously, declining groundwater levels, as recorded in the EA Barn Way monitoring borehole, were linked with the Daglingworth Stream ceasing to flow at School Hill, Stratton in mid-April until 21st May when there was significant rainfall. Since then, the Daglingworth Stream has continued to flow at School Hill, although now, in August, flow is very low. At the end of May, however, the stream dried up further downstream in the vicinity of Stratton House Hotel and Barn Way and this remains the case in August. Further assessment of the influences on Daglingworth Stream flows in this area continues.

5. River Churn Flow

As can be seen from the graph below, following peak flows of around 240 million litres per day (Ml/d) in the River Churn at the EA Cirencester gauging station early in the year, flows declined progressively since April, following the trend in groundwater levels in the Great Oolite aquifer.

Although early summer flows this year were higher than the same time in 2023, river flows of around 14 Ml/d at the end of August are very similar to last year and are normal summer flows. When flow in the River Churn falls below 32 Ml/d any abstraction by Thames Water at Baunton is halted. The river flows fell below this trigger in early July and remain below it. With typical recovery of groundwater levels and river flows, the trigger flow may be exceeded in October.



6. River Health

The health of the River Churn and Daglingworth Stream is currently being monitored via monthly monitoring of water quality and riverfly numbers. This is being done on the River Churn at Gooseacre Lane, just downstream of the Gloucester St sluices, and on the Daglingworth Stream along Riverside Walk. In addition, it is planned that environmental observations in and around the watercourses will be recorded, including wildlife and plant growth.

a) River water quality

Monitoring of river water quality covers the nutrients, ammonia, nitrate and phosphate, and turbidity, a measure of how clear the water is. Sampling and analysis commenced in February 2024 and apart from one elevated phosphate concentration in the Churn in April, there is very little evidence of pollution by nutrients, with low turbidity (i.e. clear) water.

b) Riverfly health

Monitoring of riverflies collected from the riverbed via kick sampling is being carried out at the same locations on the River Churn and Daglingworth Stream. This monitoring focusses on stoneflies, caddisflies and mayflies, which are recognised as good indicators of water quality.

The river fly monitoring commenced in June 2024 and so limited baseline data is available. This means that an appropriate trigger level indicating poor river health is yet to be confirmed. Definition of this trigger level is being undertaken by the Cotswolds Rivers Trust. Sampling to date, including August 2024, does however indicate that both the River Churn and the Daglingworth Stream are healthy and are sustaining riverflies.

c) Environmental observations

A preliminary assessment of the ecological status of the Barton Mill Pound and the Gumstool Brook has been completed by Cirencester Wildlife Group in July 2024 and initial comments have been issued on the status and the opportunities to improve the situation during low flow conditions.

7. Stream Monitoring Photographic Record

The Daglingworth Stream in the Duntisbourne valley down to Daglingworth village has reduced sightly and is flowing at a 'very low flow' level.

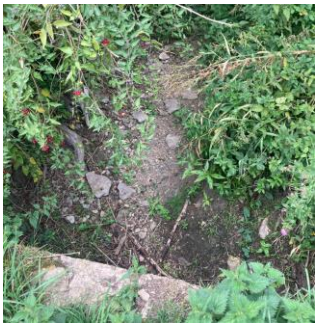
Stream levels south of the Daglingworth area have also reduced during the period. Flow is at a very low level across the Bathurst estate south of Daglingworth and ceases between 'Stratton End' and 'Barn Way' monitoring locations. The Daglingworth steam bed is then dry from 'Barn Way' monitoring point through to Barton Mill.

During August, the flow in the Churn has reduced from 21 Ml/day to 14 Ml/day as measured at the Churn flow station at Bowling Green allotments. The Gloucester St. main sluice gate remains closed and the two small sluices are fully open. The flow into the Barton Mill Pound has remained at a low flow rate during this time. The Mill Pound is starting to show increasing levels of algae and weed.

Additional stream monitoring locations have been added during the August survey to capture the flow conditions in the Churn and Daglingworth waterways in the southern areas of Cirencester. The following set of monitoring pictures was collected on the 31st August 2024 to record the status of the Daglingworth Stream and River Churn in the Cirencester area.

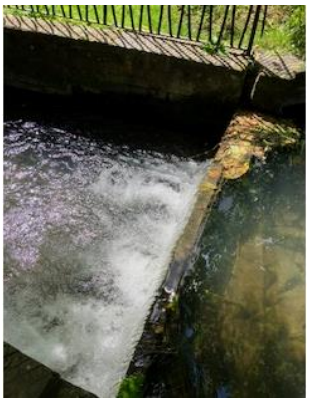
1a. Daglingworth Stream source north of Duntisbourne Abbots. Channel is very overgrown and dry.		1b Duntisbourne Abbots village spring. Water only in back section, and no flow observed.	
2. Duntisbourne Abbots downstream of inferred confluence of spring sources. A very low flow is observed in the channel.		3. Duntisbourne Leer ford. There is a low flow across the ford, that remains within 7 - 8 cobbles of the extent of the paved area of channel.	

4. Middle Duntisbourne ford. A low flow is observed that is 11 cobbles within the limits of the paved area on the south-west channel edge.		5. Duntisbourne Rouse ford. A low flow observed which extends to the paved boundaries.	
6. Daglingworth Grove Hill bridge. A low flow is observed within the field channel upstream and the garden downstream of the road bridge.	 	7. Daglingworth stream at Lower End road bridge. The garden channel upstream has been cleared. A low flow is observed in the walled channel downstream of the bridge.	 
8. Wellhill Copse stile. At the footpath stile the stream has a very low flow (reduced since July) and the water is slightly muddy.		9. Daglingworth Place ford. A very low flow is observed at the ford over the pebble weir and the water is slightly muddy.	
10. Grange Farm bridge. There is a very low flow into the farm channel. The has flow reduced since July observations.		11. School Hill bridge The stream has a very low flow similar to that at Grange Farm.	

There is evidence of a fine muddy silt building up at the edges of the channel.		This flow has reduced since the last monitoring in July.	
12. Stratton End (private road). There is a very low muddy flow at the stream. The pool downstream of the bridge is filled with muddy water.		13. Barn Way bridge. The vegetation in the stream bed has dried up and there is no flow. A low flow has been observed at this location during days of heavy rain in August. This is believed to be rainwater from the road.	
15. Footpath at Lower Stratton. The stream bed is dry. No flow has been observed at this location since the 23rd May 2024.		16a. Daglingworth Stream at Barton Lane. Location upstream of Bathurst Estate boundary wall Very low flow is observed.	
16b. Daglingworth stream at Barton Lane Location downstream of Bathurst Estate boundary wall. Very low flow is observed.		17. Gumstool Brook balancing stream at sluice gate. No flow is observed.	

18. Gunstoole Brook alongside swimming pool on the Riverside walk. A very low flow is observed, and vegetation is very thick.		20. Gunstoole Brook at culvert trash screen. A very low flow is observed, and there are water plants on the stream surface.	
22. Balancing Stream behind Salvation Army. No flow is observed.		23a. River Churn at Glos St bridge upstream of sluices A low flow is observed.	
23b. Glos St bridge sluices The large sluice is closed and the two small sluices are fully open.		24a. River Churn at the measuring gauge on Glos St bridge. Gauge is showing a level around 0.5 (0.05m) mark	
24b. Glos St bridge view towards the Mill Pound. Extensive vegetation present		24c. Mill Pound looking downstream from Glos St bridge. A very low flow is observed in the central channel. Significant vegetation present on around the stream flow.	

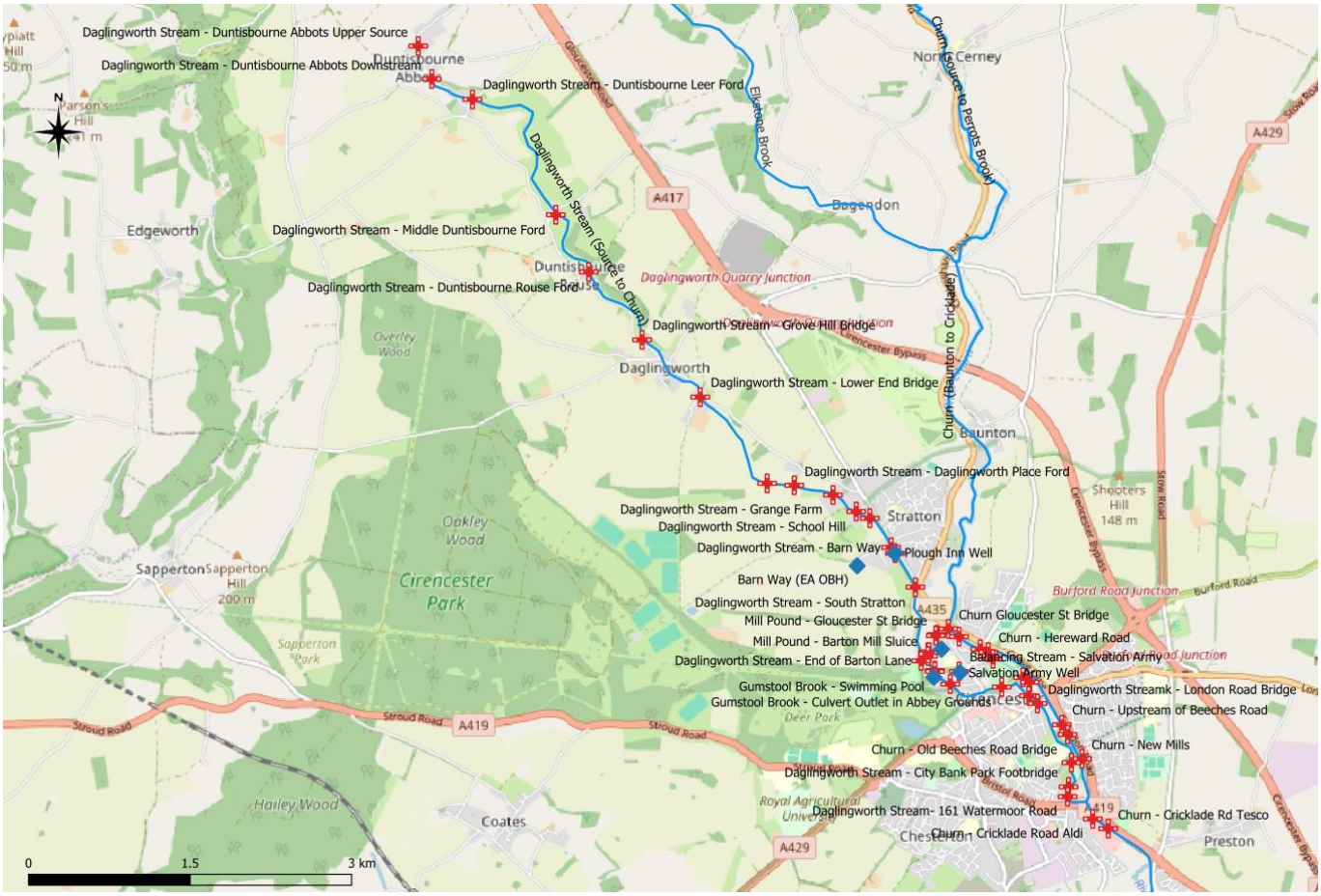
25. Mill Pound Overflow (New) No flow is observed at the offtake as the Mill pound level is significantly below the two overflow pipes.		26. Mill Pound Overflow (Old) No flow is audible.	
27a. Mill Pound upstream of footbridge. A low, almost static, flow is observed. Increased level of algae / weed is visible.		27b. Mill Pound downstream of footbridge. A low, almost static, flow is observed. Increased level of algae / weed is visible.	
33a River Churn downstream of Glos St. sluice		33b River Churn downstream from Glos St. sluice	
34a. River Churn upstream side of Gooseacre Lane bridge		34b River Churn downstream side of Gooseacre Lane bridge	

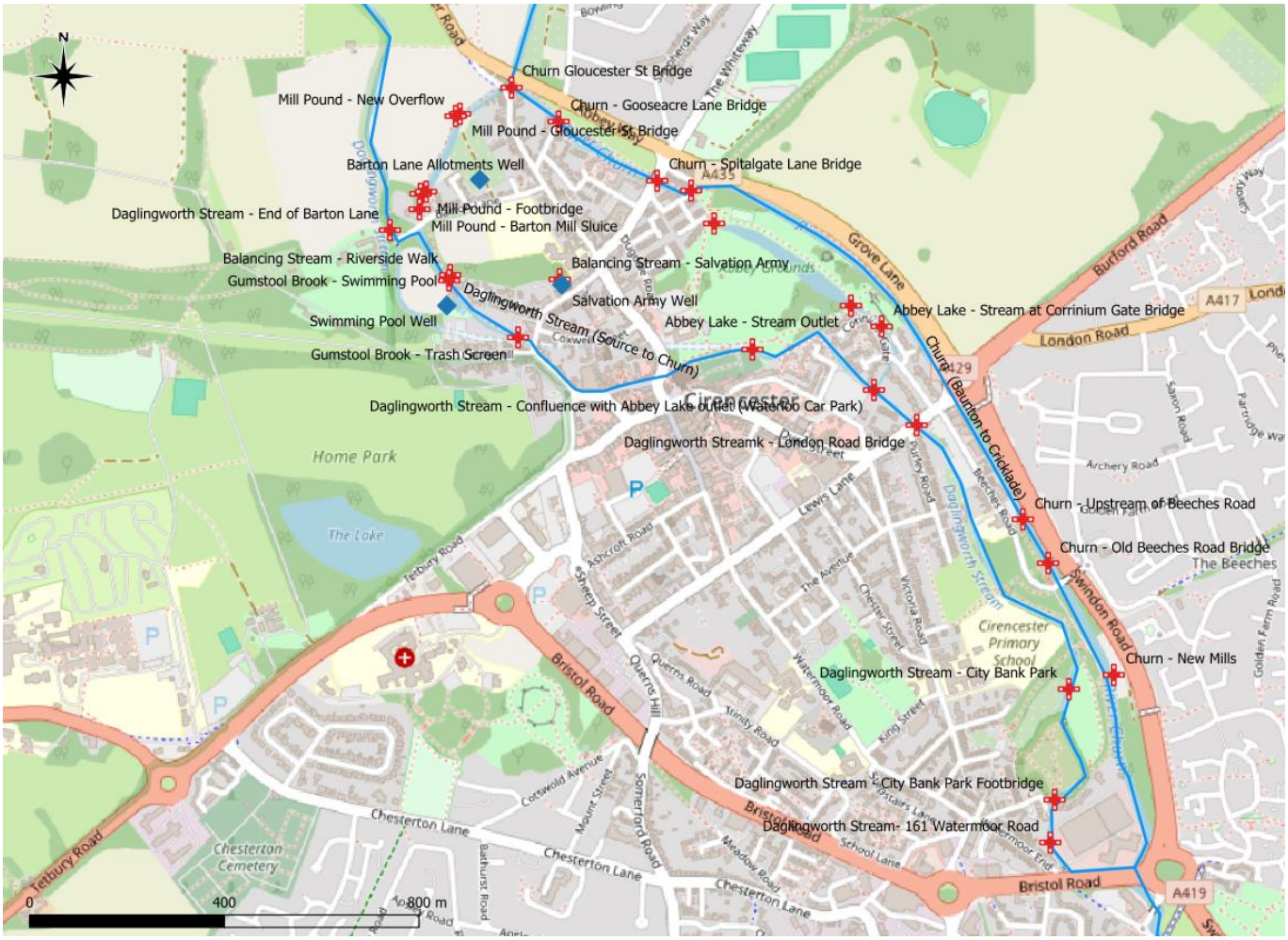
34c. River Churn downstream of Gooseacre Lane bridge		34d. River Churn downstream of Gooseacre Lane bridge	
35a. River Churn upstream of Spitalgate Lane bridge		35b. River Churn Downstream of Spitalgate Lane bridge	
36a. River Churn at Hereward Road trash screen		36b. River Churn upstream side of Hereward Road bridge	
37. Stream flowing into Abbey lake		38a. Weir at stream stream outlet from Abbey Lake	

38b. Footbridge at stream outlet from Abbey Lake		40. Gunstoole Brook culvert outlet in Abbey grounds	
41a. Gunstoole Brook - Confluence with Abbey Lake outlet (Waterloo carpark)		41b. Gunstoole Brook - Confluence with Abbey Lake outlet (Waterloo carpark)	
42a. Gunstoole Brook on downstream side of London Road bridge		42b. Gunstoole Brook on downstream side of London Road bridge	
43. River Churn upstream of Beeches Road		44. River Churn at Old Beeches Road Bridge	

46. Gunstoole Brook at City Bank Park		47. Gunstoole Brook at City Bank Park footbridge	
48. Gunstoole Brook at Watermoor Point Car park		49 River Churn at Cricklade Road (opposite Aldi)	
50a River Churn at Cricklade Road (opposite Tesco)		50b River Churn at Cricklade Road (opposite Tesco)	

The following maps show the monitoring locations





The following table provides location details of the stream monitoring locations

No.	Location Name	Grid Reference	What3Words Link
1	Daglingworth Stream - Duntisbourne Abbots Upper Source	SO 97036 08089	https://w3w.co/winners.lamenting.energetic
2	Daglingworth Stream - Duntisbourne Abbots Springs	SO 97163 07783	https://w3w.co/league.teaching.adhesive
3	Daglingworth Stream - Duntisbourne Leer Ford	SO 97544 07599	https://w3w.co/thatched.northward.enclosing
4	Daglingworth Stream - Middle Duntisbourne Ford	SO 98134 06527	https://w3w.co/reporters.slower.axed
5	Daglingworth stream - Duntisbourne Rouse Ford	SO 98621 05995	https://w3w.co/flamenco.spines.openings
6	Daglingworth Stream - Grove Hill Bridge	SO 99117 05367	https://w3w.co/processes.swipes.grouping
7	Daglingworth stream - Lower End Bridge	SO 99662 04835	https://w3w.co/objective.verbs.shoving
8	Daglingworth stream - Wellhill Copse Stile	SP 00277 04034	https://w3w.co/automate.servicing.objecting
9	Daglingworth stream - Daglingworth Place Ford	SP 00529 04013	https://w3w.co/posed.emerald.bandstand
10	Daglingworth Stream - Grange Farm	SP 00890 03931	https://w3w.co/episodes.champions.keyboards
11	Daglingworth Stream - School Hill	SP 01102 03770	https://w3w.co/undercuts.winks.retiring
12	Daglingworth Stream - Stratton End	SP 01236 03714	https://w3w.co/nursery.jacuzzi.unearthly
13	Daglingworth Stream - Barn Way	SP 01427 03440	https://w3w.co/requiring.handfuls.powers
14	Daglingworth stream - Plough Inn Channel	SP 01468 03385	https://w3w.co/flap.grafted.cuts
15	Daglingworth Stream - South Stratton	SP 01657 03072	https://w3w.co/commutes.boom.narrates
16	Daglingworth Stream - End of Barton Lane	SP 01712 02392	https://w3w.co/hydrant.paces.underway
17	Balancing Stream - Riverside Walk	SP 01835 02300	https://w3w.co/oasis.eclipses.pythons
18	Gunstoole Brook - Swimming Pool Entrance	SP 01832 02287	https://w3w.co/monks.factored.blazers
19	Gunstoole Brook - Swimming Pool Downstream Bridge	SP 02067 02394	https:w3w.co/concerts.obstruct.jeering
20	Gunstoole Brook - Trash Screen	SP 01975 02171	https://w3w.co/unicorns.carbonate.ruling
21	Balancing Stream - Powells School		
22	Balancing Stream - Salvation Army	SP 02061 02290	https://w3w.co/conquests.cried.fewest
23	River Churn - Glos St Sluices	SP 01960 02684	https://w3w.co/stooping.height.palms
24	Mill Pound - Glos St Bridge	SP 01856 02630	https://w3w.co/unguarded.thousands.gifted
25	Mill Pound - New Overflow	SP 01847 02625	https://w3w.co/arrives.headings.crisis
26	Mill Pound - Old Overflow	SP 01775 02466	https://w3w.co/sample.fuzzy.composts
27	Mill Pound - Footbridge	SP 01785 02470	https://w3w.co/sharpness.heightens.assembles
28	Mill Pound - Bartnon Mill Sluice	SP 01773 02433	https://w3w.co/yummy.rail.swan
29	Barton Lane Allotments Well		
30	The Plough Inn Well	SP 01469 03394	https://w3w.co/dote.teams.twitchy
31	Salvation Army Well	SP 02070 02268	https://w3w.co/fine.unwraps.cowboys
32	Swimming Pool Well	SP 01827 02237	https://w3w.co/veered.expansion.goad
33	Churn - Upstream of Gooseacre Lane	SP 02040 02633	https://w3w.co/idea.compacts.smashes
34	Churn - Gooseacre Lane Bridge	SP 02058 02615	https://w3w.co/moving.snaps.dentures
35	Churn - Spitalgate Lane Bridge	SP 02261 02493	https://w3w.co/vibrates.treetop.quirky
36	Churn - Hereward Road	SP 02329 02473	https://w3w.co/subject.enjoys.shackles
37	Abbey Lake - Stream Inlet	SP 02377 02404	https://w3w.co/silly.hairstyle.streak
38	Abbey Lake - Stream Outlet	SP 02658 02237	https://w3w.co/boater.rankings.scribble
39	Abbey Lake - Stream at Corrinium Gate Bridge	SP 02721 02194	https://w3w.co/essay.goes.waltzed
40	Gunstoole Brook - Culvert Outlet in Abbey Grounds	SP 02456 02147	https://w3w.co/agency.mascots.warping
41	Gunstoole Brook - Confluence with Abbey Lake outlet (Waterloo carpark)	SP 02706 02064	https://w3w.co/trinkets.inviting.dinosaur
42	Gunstoole Brook - London Road bridge	SP 02792 01991	https://w3w.co/ranks.uncouth.perfected
43	Churn - Upstream of Beeches Road	SP 03012 01797	https://w3w.co/blank.sheep.springing
44	Churn - Old Beeches Road Bridge	SP 03064 01707	https://w3w.co/that.rephrase.necks
45	Churn - New Mills	SP 03198 01478	https://w3w.co/stolen.recovery.sensible
46	Gunstoole Brook - City Bank Park	SP 03105 01449	https://w3w.co/litigate.dilute.juggle
47	Gunstoole Brook - City Bank Park Footbridge	SP 03077 01222	https://w3w.co/feelers.corrects.lucky
48	Gunstoole Brook - Watermoor Point Car park	SP 03068 01134	https://w3w.co/tabs.wing.scout
49	Churn - Cricklade Road Aldi	SP 03305 00926	https://w3w.co/bucked.duck.mailboxes
50	Churn - Cricklade Rd Tesco	SP 03442 00829	https://w3w.co/drag.aimed.look

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