# MEMORANDUM OF UNDERSTANDING
# THE FLOW OF THE RIVER THROUGH CIRENCESTER

## 1. Introduction

1.1 The control and distribution of fluvial flow through Cirencester is manually controlled by the operation of sluice gates. The operation of these gates is managed by respective riparian land owners – the Town Council is one such land owner.

1.2 The Environment Agency has in the past responded to queries from operators regarding their responsibilities relating to operation of the sluices. In addition, the Agency continues to undertake a programme of measures to reduce the risk of flooding.

1.3 The aim of this document is to ensure that the flow control structures within Cirencester are operated in conjunction with each other to minimise the risk of flooding.

1.4 The locations of the five control structures which are capable of being operated and which control flow distribution through Cirencester are shown on the Plans in Appendix A and B.

1.5 This document is based on current operational practice but takes into account improvement works which the Agency has carried out as part of the River Churn Flood Risk Management Strategy.

1.6 The Memorandum of Understanding is a living document and may require revising in the light of operational experience.

1.7 In addition to weather forecasts available to the public, the Agency's professional partners can register to receive heavy rainfall warnings by e-mail from: www.metoffice.gov.uk

## 2. The Flow of the River Churn

2.1 The River Churn flows to the sluice gates at Gloucester Street, which split the flow of water into two main routes.

2.2.1 Route 1 - The main river that flows through the Jack Gardner, the Abbey Grounds, the rear of Beeches Road and Beeches Wood, under the Tesco roundabout and past the picnic area and Tesco's.

2.2.2 Route 2 - The Mill Pond that joins the Daglingworth Stream just above the Swimming Pool and flows through the culvert into the Abbey Grounds, into The Waterloo, under London Road, Beeches Car Park, Victoria Road school field, City Bank Playing fields, under City Bank View and around the Mitsubishi site meeting up with the main river prior to flowing under the bypass to the Picnic area.

2.2.3 Another feed known as the Gumstool Brook flows from the Daglingworth Stream, along the back of The Mead to Powell's school. From the school it flows through a culvert to meet with the River Churn at Hereward Road. At this point it is the feed to the Abbey Lake. The outflow from the lake flows through Corinium Gate to meet with the flow from the swimming pool culvert at the Waterloo.

## 3. The Sluice Gates

3.1 The Town Council will endeavour to pre-empt high water situations by adjusting the flow of water through the Gloucester Street sluices in the normal course of its work.

3.2 If an emergency should arise outside of office hours we have provided the emergency services with contact details of designated grounds staff members. This person will either take action themselves to alleviate the situation or liaise with the emergency services on the most appropriate course of action.

3.3 The main gates are at Gloucester Street (controlled by Cirencester Town Council). In addition, there are three other sets of sluice gates - one at the end of the Mill Pond, one on the main river at the Old Mill House at City Bank, both operated by the respective landowners, and another at Gumstool Brook (also controlled by Cirencester Town Council), to control the flow into Powell's School.

3.3.1 Gloucester Street (5 Gates) - At normal/low flow the 2 wind up gates are open and the remaining three gates closed. This allows the main flow to go along the river and a flow along the Mill Pond. As the flow increases, more flow goes along the Mill Pond. There is a gauge board by the Gloucester Street bridge that measures the level of the river flow and when this goes above 2, the boards are lifted to send more down main river. At full flow all the gates will be fully opened.

3.3.2 City Bank - Is adjusted by the owner and at full flow will be opened fully. If it is not opened, it will flood the Mill House and Beeches Road, but not as far back as the Abbey.

3.3.3 Barton Mill - Monitored and adjusted by the Bathurst Estate but if not operated in response to increases in flow in the Mill Pond there is a risk of flooding of the footpath. Recent work undertaken by the Environment Agency has reduced the risk of flooding at Mill Place due to backing up from Barton Mill. The Agency has installed a gauge close to the gate so that the owner can now easily check the levels.

3.3.4 Gumstool Brook - A new gate was installed in 2010 with the objective of better controlling flow into Powell's School and the Mead.

3.4 The rate of flow through the main gates at Gloucester Road dictates the level of activity by Cirencester Town Council. When the flow is such that controls are needed the groundstaff will check the levels at the Mill Pond and City Bank regularly.

3.5 To assist with the prompt and effective operation of the sluice gates advice and information is sought via the BBC weather forecasts, the Met Office and Environment Agency through flood warnings and river level monitoring; this information is monitored by the Town Council's Land and Property Manager and the land and property team.

3.6 The adjustment of the gates in response to rising water levels will tend to send more volume along the main channel and the owner of City Bank sluice is duly informed by Cirencester Town Council. The current owner is vigilant in this respect and normally will adjust the sluice as the flow increases but the Town Council will check that this adjustment is made.

3.7 The Mill Pond is more likely to be affected at full flow as the adjustment of the main sluices directs more flow down the main stream but as the Town Council checks the levels, contact is made with the owner if it appears that further adjustment of the Mill Pond is necessary.

## 4. Sluice Gate Operation

4.1 The Environment Agency's operating regime document, including maps and photographs is attached at Appendix C.

4.2 This operational guidance, for the respective sluice gates, is summarized as follows:

### 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.

### 4.2.2 Additional Information

a) Under normal, non-flood, conditions the two small gates are left in the open (raised) position.

b) In this configuration flows below approx 0.1 cumec will remain in the River Churn with little or no flow passing into the Barton Mill channel. When flows are at this low level it is important that the River Churn receives all of the water derived from its catchment to minimise the risk to its valuable biodiversity. During w/c 11 July 2011 the flow in the Churn was approx 0.06 cumec.

c) As flows increase to above approx 0.1 cumec water levels will rise sufficiently to pass over the high spot in the river bed adjacent to Gloucester Street bridge and flow will begin to enter the Barton Mill channel.

d) When water levels register 0.2m (111.20m AODN) on the gauge fixed to Gloucester Street bridge, the Town Council will start to open the single large gate with the objective of preventing the water level increasing further.

e) The gate will continue to be operated to try to ensure that water levels do not exceed the 0.2m mark until the gate it is fully open or until water levels begin to drop.

f) If water levels are still rising following the complete opening of the Gloucester Street Sluices, the Town Council will need to inform the Bathurst Estate of the situation.

g) The gate will be completely shut when the reading of the gauge board drops back to 0.1m.

### 4.2.3 Gumstool Brook Offtake (Cirencester Town Council)

a) Normal, non flood conditions:

i) The underside of the gate should be kept level with the top of the 'V' notch plate.

b) Flood conditions:

i) The gate should only be opened (in stages) if rising water levels start to flood the public footpath and only if water levels in the Meade are lower that that in the Daglingworth Stream;

ii) Inform the owner of New Mill of any gate movement as opening the gate will increase flow into the River Churn via Hereward Road;

iii) When water levels start to fall and the rainfall forecast is favourable the gate should be returned to the normal, non flood condition;

iv) Inform the owner of New Mill of gate movements.

### 4.2.4 Additional Information

a) During a period of rising water levels the gate at the Gumstool Brook offtake will have been it its usual partially closed position. Under normal, non flood conditions, the gate is only required to be open sufficiently to allow a sweetening flow to pass into the Gumstool Brook from the Daglingworth Stream.

b) The gate could be opened to pass flood flows into the Gumstool Brook but water will have already backed up through the Thomas Street Culvert from Hereward Road and the natural flood storage area of the Meade will have been mobilised in part or completely.

c) Opening the Gumstool Brook offtake would use up any remaining storage more quickly and raise water levels along the Gumstool Brook increasing the risk of flooding of Powell's School and properties at the Meade via the gardens. Not opening the Gumstool Brook offtake will risk flooding of properties at the Meade by overtopping the footpath and passing through access gates. Also a greater flow will pass down to Corinium Gate.

### 4.2.5 Barton Mill Sluices (Bathurst Estate)

a) Normal, non flood conditions:

i) The gates should be kept fully lowered to provide overspill control;

b) Flood conditions:

i) Warning call received from Cirencester Town Council when sluices at Gloucester Street are fully open.

ii) The gates should remain closed allowing water levels in the mill channel to rise and overtopping flow to increase.

### 4.2.6 Additional Information

a) Under low flow conditions in the River Churn the two sluices at Barton Mill will be shut thus retaining a head of water in the Barton Mill channel.

b) Under very low flow condition (0.1 cumec and below) no flow will enter the channel and it can be expected that water levels will drop through leakage at the gates and via what is thought to be a piped link which passes water from the channel into the flood plain of the Daglingworth Stream.

c) This link is situated within the garden of the mill house and stops running when water levels in the channel drop sufficiently.

d) When flows in the River Churn increase and water levels in the Barton Mill channel start to rise, the partial opening of a gate at the mill would establish an increased sweetening flow along the Barton Mill channel.

e) However, maintaining a constant water level in the channel would be difficult to achieve with an undershot gate and is likely that frequent gate adjustment will be required.

f) Alternatively consideration could be given to reducing the height of one or both gates to allow water to overspill the top(s) and provide a self regulating water level control.

g) If the Town Council contacts the Estate when Gloucester Street Sluices are fully open and water levels are still rising, the Estate will need to consider opening the gates at Barton Mill to control water levels.

h) When the reading on the gauge board at the mill reaches 111.30m, one gate should be opened by 150mm (100mm if the height of one or both gates have been reduced). This configuration approximates to the condition of the sluices as used for all return periods in the recently revised mathematical model.

i) If water levels continue to rise there is a risk that the grounds of the Mill House will flood via the sill of the disused sluice situated opposite the main sluice gates. This risk can be reduced by either opening the gates further when the reading on the gauge board reaches 111.30m or by blocking off the disused sluice or raising the sill. It would be preferable to block off the sluice or raise the sill so that the mill channel can impound more water rather than increasing discharge directly into the Daglingworth Stream and passing additional flow down to the Gumstool Brook offtake, the Mead and to Corinium Gate.

j) Assuming that the disused sluice is blocked off and one main sluice gate is open 150mm or 100mm as noted above, water levels could be allowed to rise to the predicted 1 in 30 year level of 111.64m as recorded on the gauge board. If water levels continue to rise, consideration can be given to opening the sluice gates further or taking no action and allowing water levels to continue to rise. Eventually water will overtop the right bank footpath to spill into the flood plain of the Daglingworth Stream. Water exiting from the flood plain is controlled by a culvert under the access road to the estate and thus restricts flow passing down to the Meade and Corinium Gate.

k) If, despite allowing water to overtop the footpath, the reading on the gauge board reaches 111.80m there is a risk that water will overtop the left bank and flood Barclay Court. In this situation consideration will need to be given to opening the sluice gates further to try to prevent the water level from rising above 111.90m. At this level water will be spilling over the right bank footpath to a maximum depth of approx 150mm.

l) Water exiting from the flood plain is controlled by a culvert under the access road to the estate and thus restricts flow passing down to the Meade and to Corinium Gate.

### 4.2.7 New Mill (Privately Managed)

a) Normal, non flood conditions:

i) All three gates should be kept closed. Flow passes over the fixed crest of the left bank sluice.

b) Flood conditions:

i) Cirencester Town Council to inform owner of gate movements at Gloucester Street Sluices and Gumstool Brook.

ii) Progressively raise gates as required to keep head water levels from rising. When informed by the Town Council that water levels are no longer rising upstream and that the rainfall forecast is favourable progressively return gates to the normal non-flood condition.

### 4.2.8 Abbey Grounds Dam Boards (Cirencester Town Council)

This structure controls water levels in the Abbey Grounds lake. The structure is not operated unless the water level in the lake needs to be lowered for inspection, maintenance or emergency reasons.

## 5. Routine Maintenance

5.1 The Town Council's grounds team check on a regular basis along the course of the river for obstructions and ensure that the grids at the culverts and lake are kept clear.

5.2 During the Autumn and Winter the grounds team undertakes a cutting back of the vegetation on the river banks within its own land ownership, including areas around the Mill Pond; this work assists the flow of the river and contributes to what the Town Council is reasonably able to do to minimise flood risk.

5.3 The Environment Agency clears the trash screen at Thomas Street using the Agency's permissive powers.

## 6. Issues and Trouble Spots

6.1 Main River - At full flow the River Churn can back up into the Jack Gardner area of open space and gets close to the nursing home and flats. It can flood across the Beeches Road near Rivercourt, spreading out at the City Bank sluice and floods again at the picnic site.

6.2 Mill Pond - Mill Place has flooded on one occasion when the Barton Mill sluices were not opened sufficiently.

6.3 Water levels in the Gumstool Brook as it passes along the back of the Mead and down to Powell's School are determined by levels in the River Churn, which backs up from Hereward Road, and flow taken from the Daglingworth Stream.

6.4 In most conditions, flow from the Daglingworth Stream is controlled by the new sluice. In very low flow conditions no flow is taken from the Daglingworth Stream. As water levels increase flow will pass into the Gumstool Brook over a V notch plate fixed to the sluice. Flow through the sluice can be cut off at any time if required leaving back up from the River Churn to determine levels in the Gumstool Brook.

6.5 Back up from the River Churn can be partially controlled by limiting flow passing through Gloucester Street Sluices. However this action will have the effect of diverting additional flow into the Daglingworth Stream via Barton Mill and raising water levels in the stream.

6.6 At high waters levels the new sluice can be bypassed via a ditch which runs along the public footpath from Barton Mill to discharge into the Gumstool Brook immediately downstream of the new sluice. The possibility of closing off this ditch is being considered by the Agency.

6.7 It should be noted that at times of flooding, the responsibility of the Town Council is to ensure that water flows through land in its ownership without restriction. It therefore follows that the same responsibility falls on riparian owners throughout the length of the river. The legal position is that sluice gate operators cannot hold water back during times of high flow and potentially flood at that point – the water has to be allowed to flow through at the potential risk of flooding 'down stream'. The rights and responsibilities of riparian owners are enforced through the Land Drainage Act 1991, Water Resources Act 1991 and Public Health Act 1936.

6.8 At times of low flow, i.e. drought conditions, the current advice from the Environment Agency is that flow from the River Churn should not be diverted to increase the natural flow in the Daglingworth Stream – the impact on local biodiversity and habitats is noted at these times and should this advice change at any time then the Town Council will amend the operation of its sluices.

## 7. Emergency Planning and Flood Plan Policy

7.1 In its role in providing local leadership, for and on behalf of the people and place of Cirencester, it is important that the Town Council provides advice and support in building resilience against the impact of an emergency or disaster.

7.2 Advice and support can be provided so that planned actions are undertaken before and during an emergency or disaster which in turn minimises the impact on the community and in helping the local community to recover more quickly after an event.

7.3 Building resilience within the community will assist in identifying local needs and priorities arising from an emergency/disaster.

7.4 In this respect the Town Council has adopted an emergency planning and flood plan policy, the aims being to identify:

7.4.1 vulnerable people and places within the community;
7.4.2 hazards and possible mitigation measures;
7.4.3 resources and key contacts in the community.

7.5 Local flood risk management includes flooding from ordinary watercourses, surface runoff and ground water; the Environment Agency continues to be the lead organisation responsible for main rivers/sea related flood risk and sewerage flood risk remains the responsibility of local water companies.

## 8. Operational Contact Numbers

Cirencester Town Council: https://cirencester.gov.uk/contact-information

Bathurst Estate: https://www.bathurstestate.co.uk/contact/

## 9. Emergency Contact

Environment Agency Floodline 0845 988 1188 (24 hour service) or Type talk 0845 602 6340

https://www.gov.uk/sign-up-for-flood-warnings

Gloucestershire County Council Out of Hours Emergencies 0845 6677788 (from 5pm to 9am only)

Cotswold District Council Out of Hours Emergency Flood Situation call 01513 432942

https://www.cotswold.gov.uk/residents/communities/emergency-response/

## 10. Useful Information

10.1 River Levels South East (River Churn Cirencester)

https://flood-warning-information.service.gov.uk/river-and-sea-levels?location=cirencester

10.2 Flood Maps https://flood-map-for-planning.service.gov.uk/

10.3 Practical Information

http://www.environment-agency.gov.uk/homeandleisure/floods/default.aspx

## 11. Effectiveness and Review

The Memorandum of Understanding is reviewed on an annual basis by the Land and Property Group; day to day operation is led by the Land and Property Manager and overseen by the Lead Member for Land and Property.

## Version of Document

| Version No | Review Date | Author | Comments |
|---|---|---|---|
| 2. | 2018 | CTC | Updates:<br>8. Contacts<br>9.2 Flood Maps web link updated |
| 3. | 2019 | CTC | Contact Details<br>Web Links |