

# Flood Risk Appraisal Report

## The Bourn Flood Risk Management Scheme

November 2024

### Report 1 – Why Flood Risk Management is needed

This is the first of two reports. This first report sets out the flood history within The Bourn catchment and presents the latest available flood risk modelling information. It focuses on the fluvial (river) flood risk, highlighting the problem and the reason we believe flood risk management is needed. The second Options Appraisal report will cover the possible measures that could be implemented to reduce flood risk. The aim of these documents is to improve understanding and support effective, inclusive, and meaningful engagement with the community.

### Introduction

The Bourn is a heavily urbanised watercourse situated to the south of Birmingham, running through Bournville and Stirchley before it meets the River Rea. The nature of the catchment is such that the onset of fluvial (river) flooding following intense storms can be rapid, with encroachment into the floodplain. Flooding in 2008, 2012, 2016 and 2018 impacted several communities throughout Birmingham, including Bournville and Stirchley. As well as river flooding the Bourn Catchment is also prone to surface water flooding. Figure 0.1 shows The Bourn catchment area and gives an idea of the area of interest for the project.

The confluence of The Bourn and River Rea is an area designated as a Rapid Response Catchment (RRC). A RRC is where a river or stream can react very rapidly to rainfall and generates dangerous flood depths and high velocities of water that can pose an extreme threat to life. The flash floods in Boscastle (2004) and Helmsley (2005) instigated an investigation into other areas across England that could be at risk of flash floods. When defining a catchment as a RRC three factors are considered; the speed of response (time to peak, taking into consideration multiple factors including urban run-off); the severity of flooding (depth and velocity); and the number of properties impacted and presence of vulnerable buildings. The calculations for The Bourn at Bournville/Stirchley designated it as a Very High Risk RRC.

The climate is changing and the risks from these changes include altered rainfall patterns, increased flooding and ecosystems that cannot change as quickly as the climate. The Environment Agency is committed to helping communities become more resilient to these impacts, including updating river flood models to evaluate the potential impacts of climate change under different scenarios. The recently updated model for The Bourn catchment has shown that there are approximately 140 homes and businesses in the catchment at risk of flooding now, rising to an estimated 200 with increased climate change risks in the future.

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The question now is how we can best address this. Our primary aim is to investigate ways to reduce this risk and provide better protection for these homes and businesses. This will mean people living and working in the Bournville and Stirchley area will have improved peace of mind from the worry of flooding. Any potential scheme is at an early stage with no preferred option. We are currently assessing some of the possible measures that could be implemented. We want to work with the community to not only look at what is technically and financially possible, but also understand what would be acceptable and in keeping with the social heritage of the area. Any solution must reduce flood risk and enhance the biodiversity of the local environment.

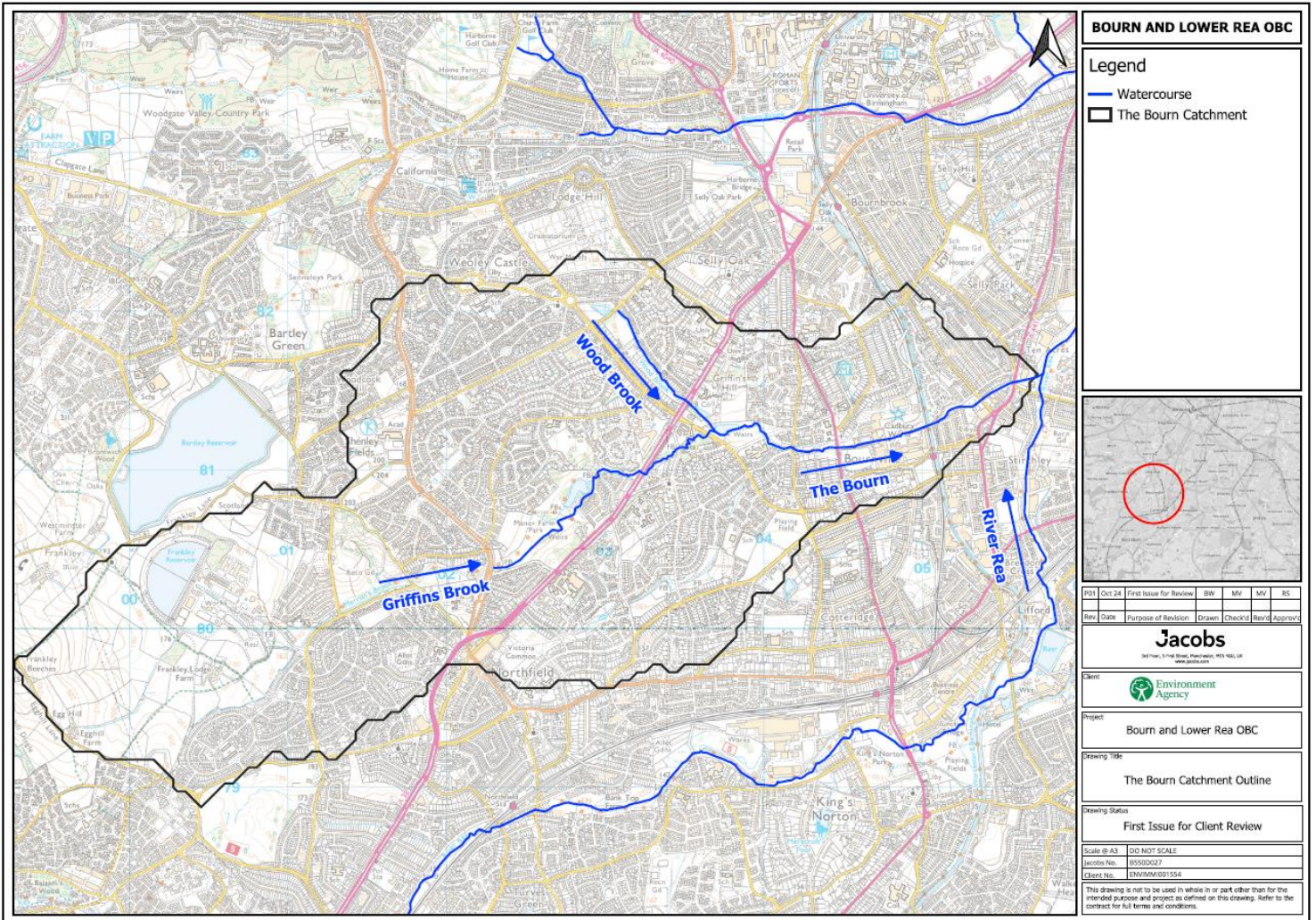


Figure 0.1: The Bourn Catchment Area.



## Historic Flood Risk in The Bourn Catchment

Floods in Birmingham have caused major damage to people's homes and businesses. Many people remember the flooding events in 2008, 2012, 2016 and 2018. More recently, in October 2023 there was flooding from The Bourn and Wood Brook. The photographs below illustrate the impact from some of these previous flood events (see figures 1.0 to 1.5). It is likely that a number of factors and sources contributed to these events, including flooding from rivers, surface water and from sewers and highway drainage.



*Figure 1.0: September 2008 Flooding across the Bristol Road at Weoley Hill Park, taken from the central reservation looking NE towards Selly Oak. Culvert capacity, potential blockages and surface water runoff are likely contributing factors in this location.*

*(From EA files – source unknown)*



*Figure 1.1: September 2008. Flooding across the Cartland Road and Pershore Road junction looking West from Cartland Road. Modelling shows that water from The Bourn effects this area. Surface water will also have a contribution. (Source: Birmingham Mail).*



*Figure 1.2: October 2012. View from Middle Park Drive looking NE to Woodbrooke Grove. New House Farm Drive to the right and Merritts Brook to the left which has overtopped the bank. Work has since been completed to improve the culvert capacity, but modelling shows this area remains at fluvial flood risk. (Source: Birmingham Mail)*



*Figure 1.3: June 2016 Flooding on the Pershore Road near the Cartland Road junction, Stirchley. This location is very close to fig. 1.1 showing the 2008 event. Modelling shows that water from The Bourn is likely to affect this location, although surface water will also be a contributory factor. (From EA files – source unknown)*





Figure 1.4: June 2016 Another view of flooding across the Pershore Road, Stirchley, looking South.

(From EA files – source unknown)

## Birmingham flash flooding causes more chaos

17 June 2016

Bournville

There was no escaping for some either by road...

Birmingham flood lifts cars from roads as houses are deluged

Flash flooding across the West Midlands has caused chaos with hundreds of homes, businesses, cars and roads becoming submerged under water.

Figure 1.5: BBC Website showing some of the impacts from the devastating floods across Birmingham in June 2016, including the Bournville area.

<https://www.bbc.co.uk/news/uk-england-birmingham-36556884>

These events caused widespread flooding to homes and businesses, threatened lives, destroyed personal belongings, damaged vital infrastructure and prevented access to essential public services across Birmingham.

Flooding in The Bourn catchment is not just limited to river flooding (fluvial) and can often be from multiple sources. Surface water (pluvial) and sewer flooding can also occur, particularly in heavily urbanised areas, when so much rain falls in a short space of time so that the local drainage cannot move it away fast enough. We are working with partners and the community to better understand these risks and potential solutions. The roles and responsibilities of the relevant organisations are detailed in the document: Your watercourse: rights and roles, see the link below:

<https://engageenvironmentagency.uk.engagementhq.com/27275/widgets/77300/documents/65543>

## Flood Warning Service in The Bourn Catchment

The areas at risk of flooding from the River Rea, The Bourn and its tributaries are covered by two Flood Warning areas. The river gauges (Hydrometric monitoring sites) are marked on the map (Figure 2.0) with a blue square. These gauges measure the river level and alert Flood Warning Duty Officers that Flood Warnings may need to be issued. The 'River Rea at Stirchley' flood warning area is marked in yellow on the map and alerts triggered by the river levels recorded at the Selly Park and/or Longbridge Bristol Road South gauges. The 'Bourn at Bournville' flood warning area, marked in purple on the map, is triggered by Bournville Woodbrooke Road river gauge.

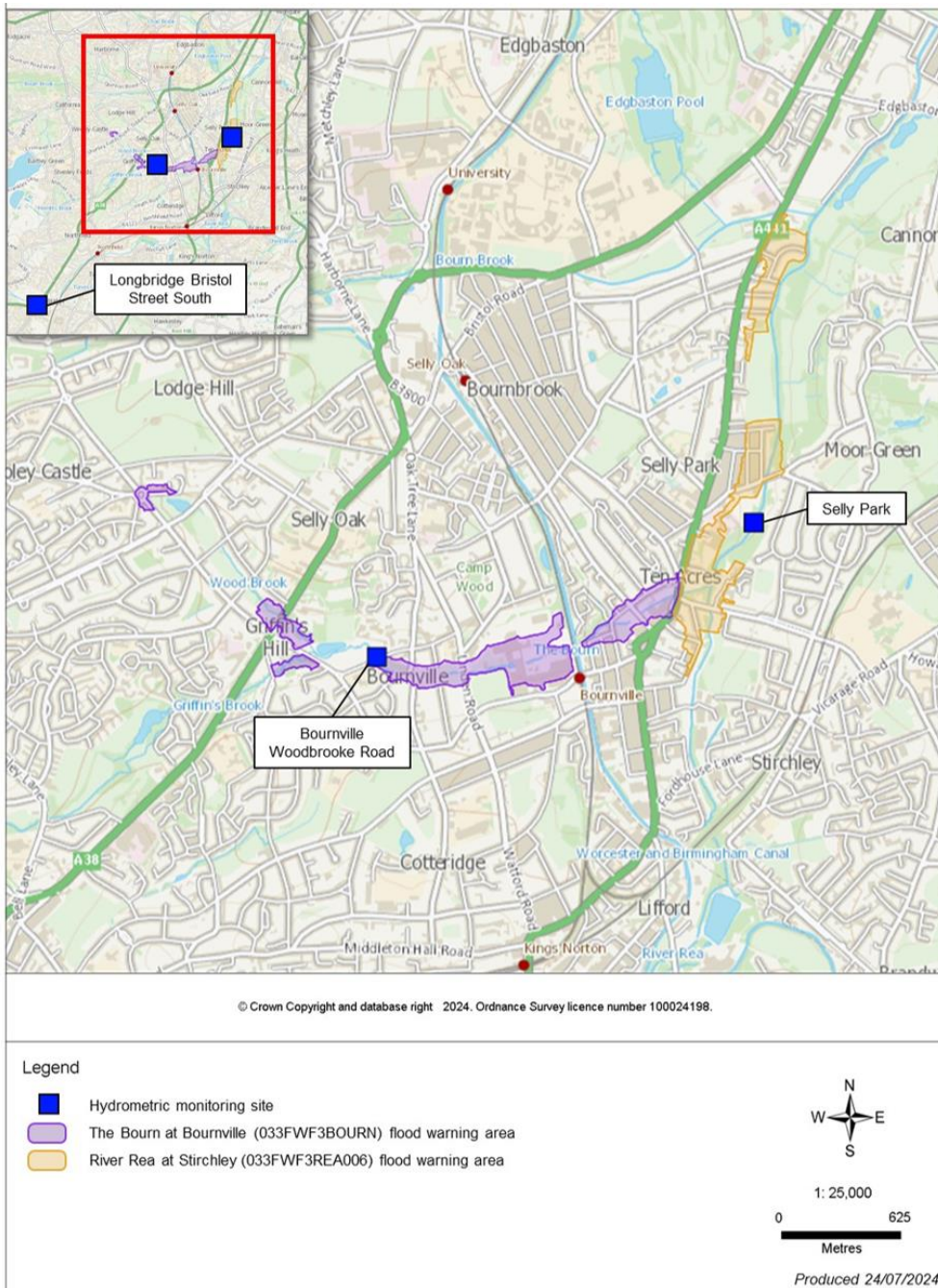


Figure 2.0:

The Flood Warning areas. (Please note that these areas are based on previous model information and so may not match the updated flood model outlines exactly.)



The Selly Park river gauge data (figure 2.1) shows the history of the river level at this location on the River Rea since 2013. The Stirchley Flood Warning was issued during the 2016 and 2018 flood events and more recently the flood warning level was exceeded twice in 2023 and in September 2024.

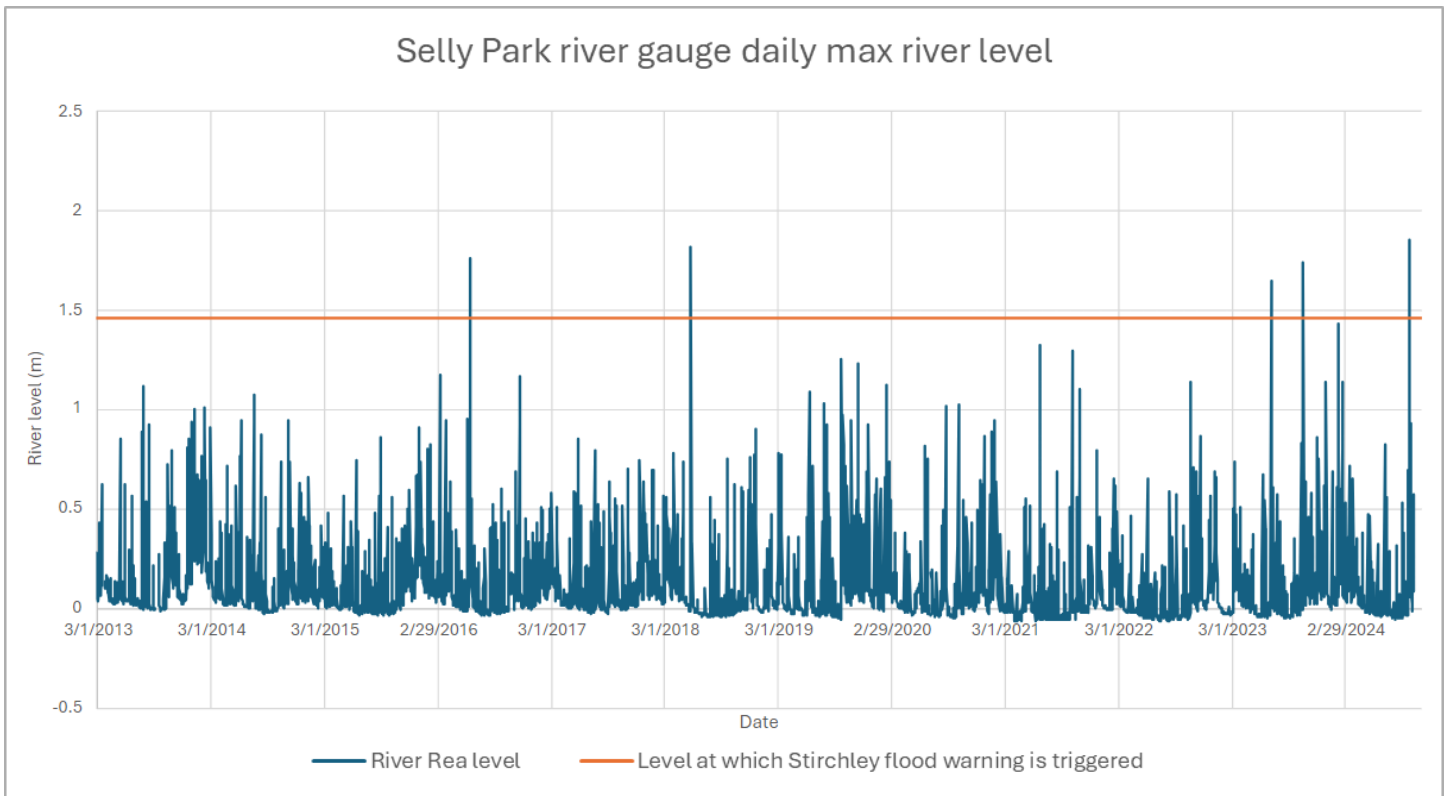


Figure 2.1: The Selly Park river level data since 2013.



The river gauge on The Bourn at Bournville has only been operational since 2021 so the chart in Figure 2.2 does not have the same historical data. The chart shows that the flood warning level has been exceeded several times over the last few years, with the highest level being recorded in September 2024. With all new gauges the level at which a flood warning is triggered is reviewed as impact information is gathered and used to refine the most appropriate river level to trigger issuing a warning.

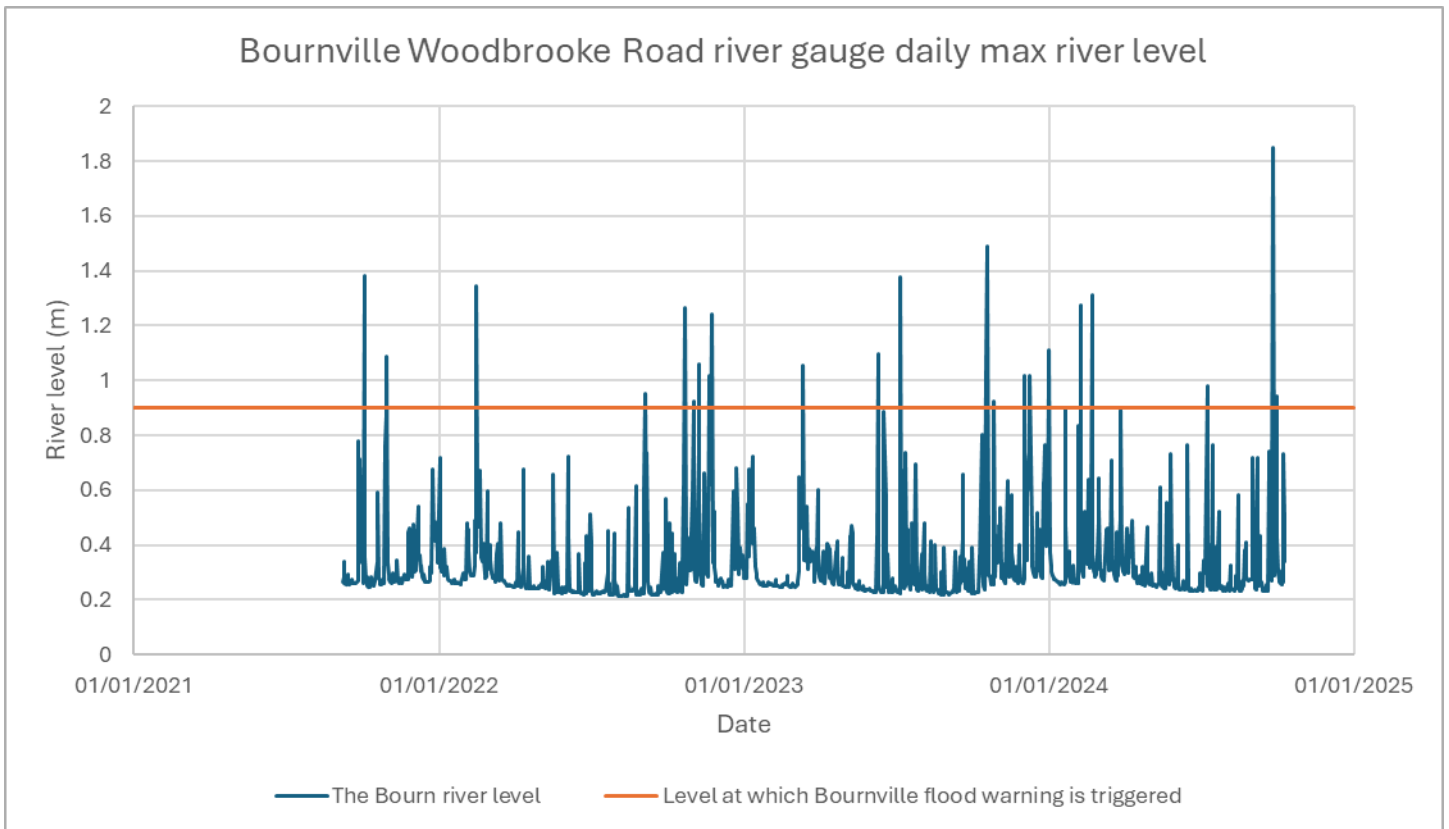


Figure 2.2: The Bournville Woodbrook Road river level data since October 2021.

With anticipated climate change impacts and a rising urban population, we are likely to see an increase in both the likelihood and impact of flooding in the future which is why we are exploring options to help better protect communities at risk of flooding in the Bournville and Stirchley areas of Birmingham.

## Modelled Flood Risk in The Bourn Catchment

We have now completed the first phase of our model update, which incorporates the latest industry standard methodology, updated hydrology and verification to historic flood events. The model looks at how current and future rainfall patterns would affect the river. The first two maps below show the flood depth predictions for a flood event for the 'Do Minimum' scenario. The 'Do Minimum' scenario is the best model representation of what is happening on the ground today, continuing with ongoing maintenance of the watercourse, such as clearance of blockages. (In comparison to a 'Do Nothing' scenario which implies stopping any maintenance).

Figure 3.0 shows the present-day picture and figure 3.1 shows the maximum extent of flooding in the future with no flood risk management intervention, for the 1% Annual Exceedance Probability (AEP) event. AEP is a term used to express the percentage of likelihood of a flood of a given size or larger occurring in any given year. If a flood has an AEP of 1%, it has a one in 100 likelihood of occurring in any given year. The maps show that there is flood risk throughout the catchment all the way along The Bourn in both scenarios. When you consider the impacts of climate change with no intervention, the future flood risk is significantly greater in terms of flood outlines and water depths, particularly around Bond Street in Storchley.

In a 1% AEP flood event, the model shows that The Bourn has a flow of 18.1m<sup>3</sup>/s just before its confluence with the Rea. The Rea has a flow of 34.4m<sup>3</sup>/s just before this confluence contributing 64% to the Rea just downstream of the confluence, whereas The Bourn contributes 36% in this event. The contribution to flows does vary, so too does the flow capacity of each watercourse and therefore the consequence of a particular flow on any given watercourse varies. The Rea can deal with far more water than The Bourn before flooding occurs. Flooding from the Bourn can occur independently to flooding from the Rea upstream of the confluence in the Bournville and Storchley area.

This modelling has provided us with an initial estimate of the number of properties at risk of flooding from different scale flood events within The Bourn catchment. For the 1% AEP flood event there are approximately 140 properties at risk in the present-day scenario. This increases to potentially 200 properties in the future considering the impacts of climate change over the next 100 years, with no intervention. Figures 3.2 and 3.3 show the approximate location of these properties at risk rather than the exact property locations due to the scale of the maps. Short video animations can be viewed online at: <https://www.reacatchmentpartnership.co.uk/the-bourn-flood-risk-management-scheme/>, These show the sequence of flooding from The Bourn throughout the watercourse in a 1% AEP event.

The 'Do Something' scenarios will be the next stage to look at testing different flood risk management options in the model. This will allow us to see the flood risk benefits of different options and combinations of options. We can then share this information with stakeholders and the local community once it is available. Ground investigations will also be required to understand what is possible within the area. Conducting ground investigations does not mean an option has been chosen to take forward but allows us to understand what is and what is not possible within the area.



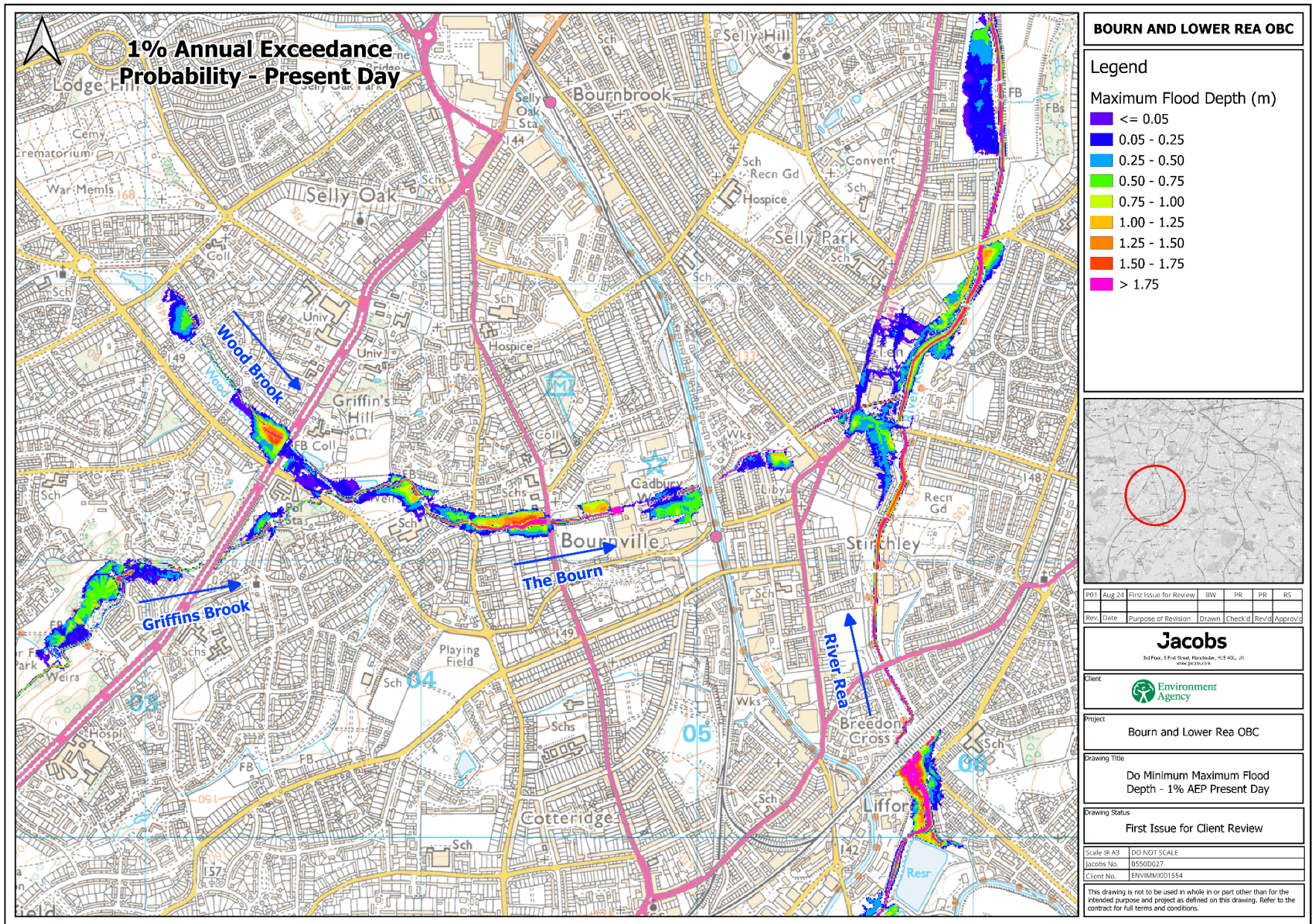


Figure 3.0: Do Minimum - Present day maximum extent and depth of flooding with no flood risk management intervention, (1% AEP event).



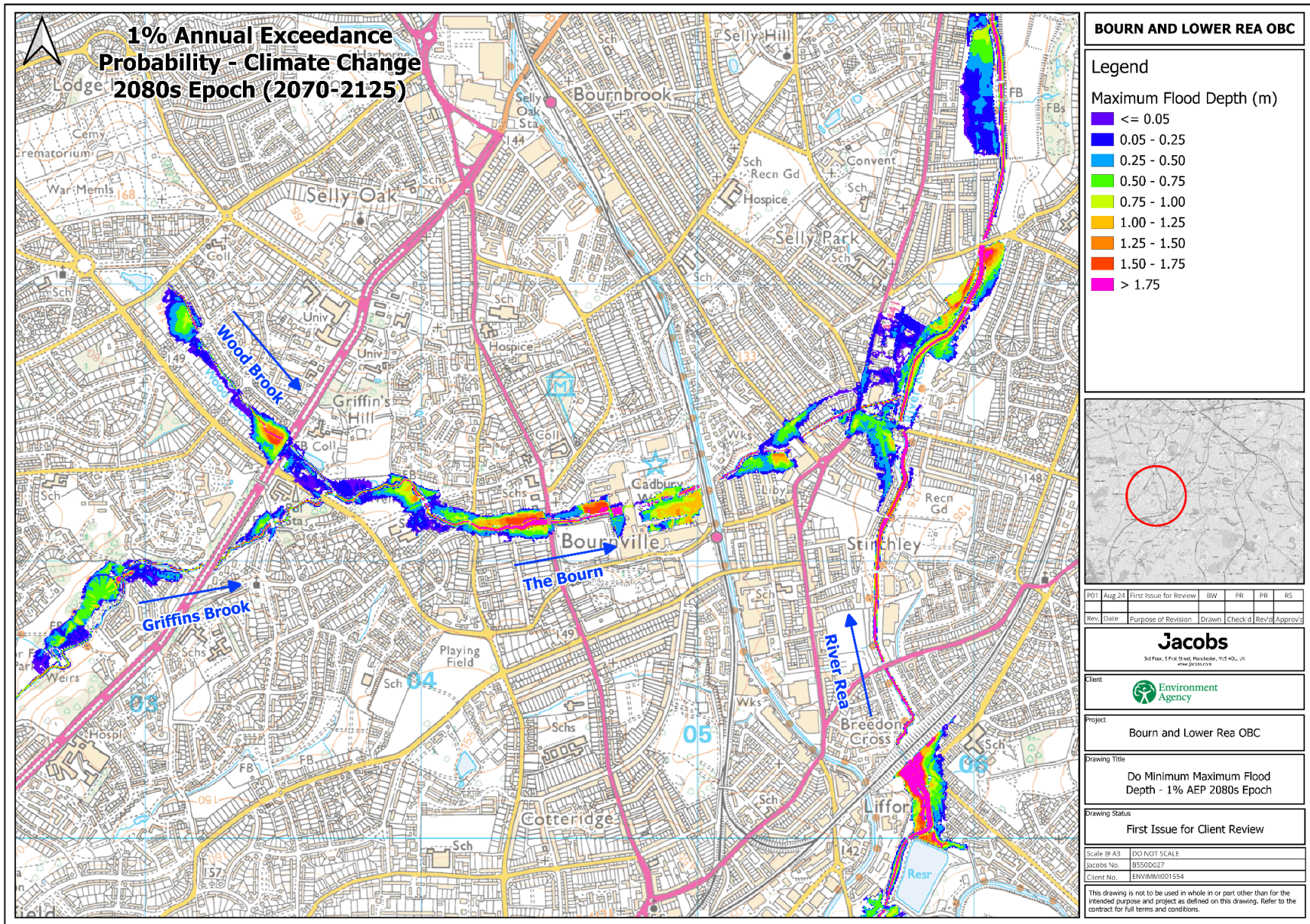


Figure 3.1: Do Minimum - Future predicted (including climate change predictions) maximum extent and depth of flooding with no flood risk management intervention, (1% AEP event).



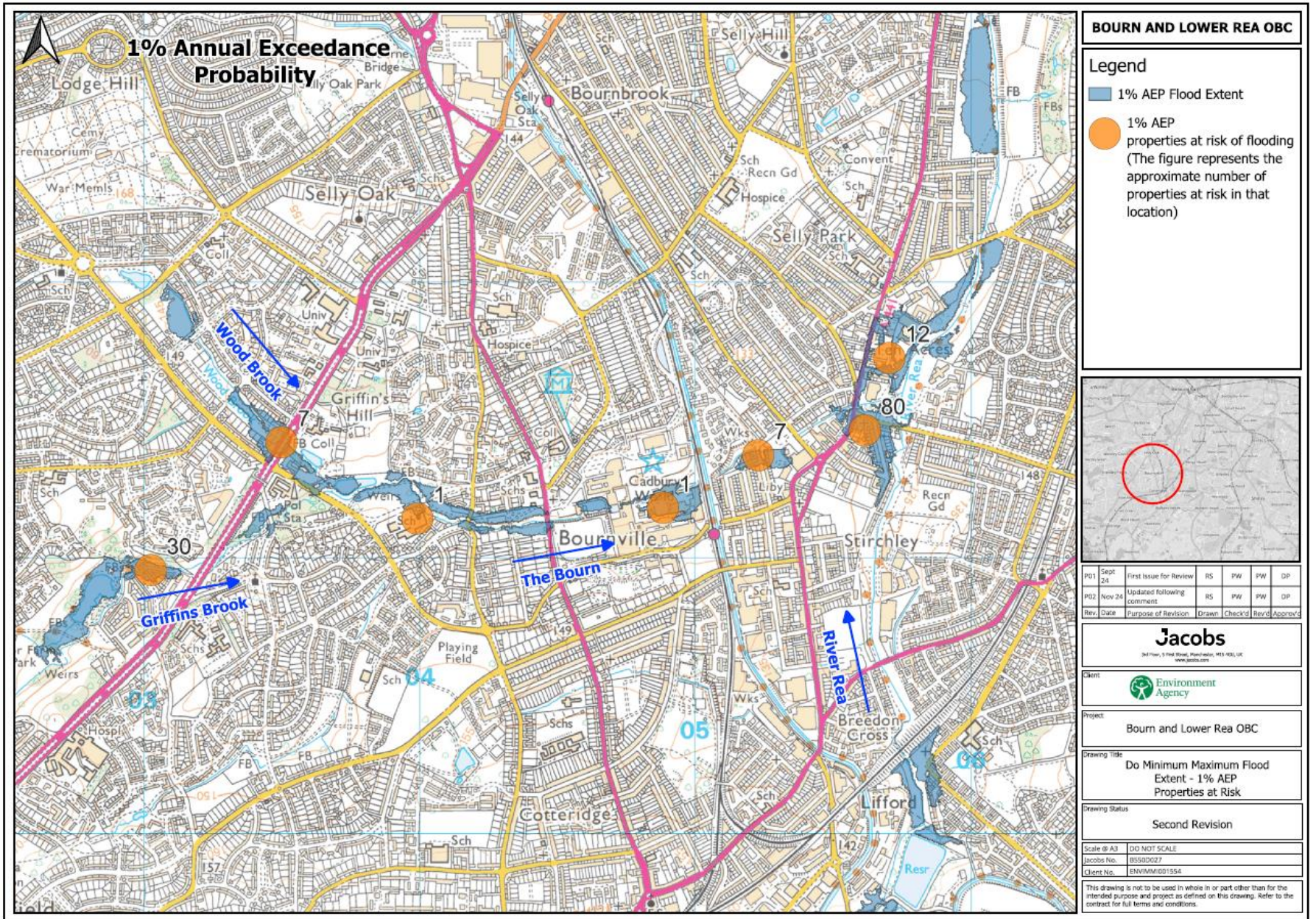


Figure 3.2: Do Minimum - Present day – location and number of properties at risk



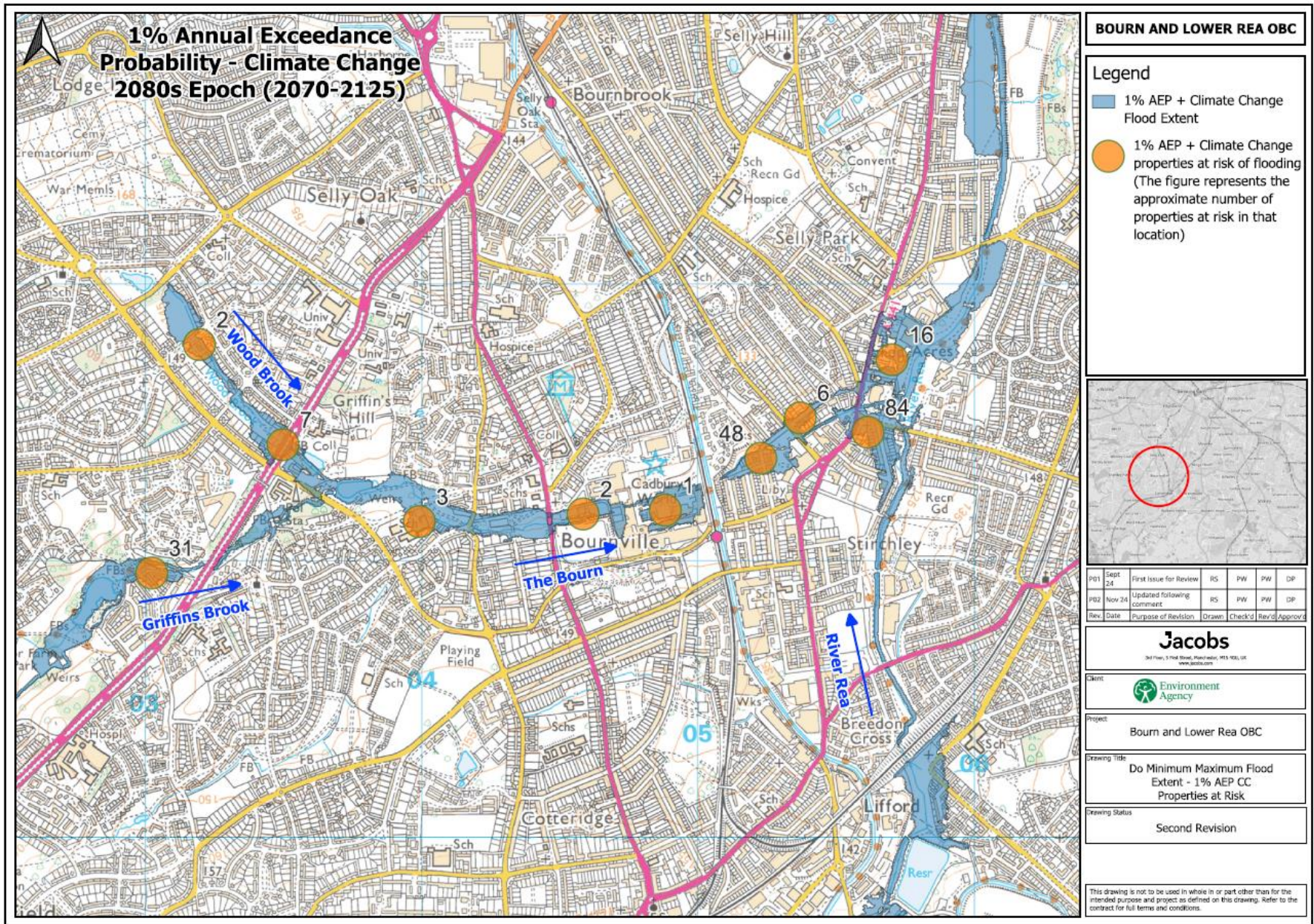


Figure 3.3: Do Minimum - Location and number of properties at risk incorporating climate change predictions



## Project Objectives

The overarching objectives below show what we are trying to achieve for communities along 'The Bourn' -

- **Objective 1 – Reduce Flood Risk**
  - Provide flood risk reduction to residential homes and businesses in the communities of Bournville and Stirchley by March 2030.
  - Include a provision for the impacts of future climate change, taking a catchment-based approach to flood risk reduction and promoting nature-based solutions where appropriate.
- **Objective 2 – Make Financial Decisions that Work for Communities and Partners**
  - Ensure that the project delivers in line with government funding rules, securing sufficient partnership funding to ensure scheme viability.
  - Deliver wide ranging benefits by working in partnership with others. The scheme should look to not only reduce flood risk but also deliver environmental enhancement, support sustainable growth and safeguard the cultural heritage of the area.
  - Maximise opportunities to enhance public open space in line with partner, community and heritage initiatives. Roll out of inclusive engagement process and tie in with Rea landscape visioning project to identify further opportunities.
- **Objective 3 – Support and Improve the Natural and Built Environment**
  - Deliver a solution that avoids/minimises/mitigates any measures that would impact negatively on the protection and improvement of the natural and built environment.
  - Aim to deliver 20% Biodiversity Net Gain (BNG calculations and assessments to be undertaken at Outline Business Case stage).
  - Maximise opportunities for areas of habitat to be created that contribute to Water Framework Directive targets.
  - Increase climate adaptation and resilience through the consideration of nature-based solutions that support nature recovery networks.
- **Objective 4 – Deliver Improvements to Long Term Sustainability**
  - Deliver a solution that addresses the future impacts of climate change and promotes resilient and sustainable place building.
  - Support the EA 2030 Mission Statement around Net Zero by considering low carbon options and incorporating offset measures following the carbon hierarchy.
  - Ensure identified solutions have a long-term maintenance strategy, and budget, for the lifetime of newly created assets.
  - Maintain, protect and enhance the cultural heritage of the area for future generations.

## Summary

We are committed to working with those who live and work within these communities, whether personally at risk of flooding or where there is potential to be impacted by possible options to reduce flood risk to others. We have heard and understood the concerns of residents and groups near the parks in relation to the potential creation of temporary water storage areas to manage flood risk downstream. We are at a very early stage in this process and, while options are being explored, no decisions have been made. The follow up Options Appraisal report will cover the possible measures that could be implemented to reduce flood risk. We want to ensure that any future decisions are properly informed by the community and welcome your comments.

## We want to hear from you

Please follow the link below or scan the QR code to answer a few short questions on your experiences of flooding and how strongly you feel the risk of flooding needs to be addressed.

<https://forms.office.com/e/YpgFG6ZQMn>



You can find further information about the scheme on our website: [Bourn Flood Risk Management Scheme - Environment Agency - Citizen Space \(environment-agency.gov.uk\)](https://www.environment-agency.gov.uk/bourn-flood-risk-management-scheme-citizen-space)

If you have not yet signed up to our mailing list and would like to be included on this, please let us know at [Thebournfrms@environment-agency.gov.uk](mailto:Thebournfrms@environment-agency.gov.uk)

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