Flood Review July 2007

Aston

An investigation into the causes and flood risk management options

David McKnight March 2008

ea/br/e/std/v1

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Executive summary

Following the flooding of July 2007, which we understand affected a total of 12 properties in Aston, we have investigated options to improve the level of flood protection. This study aims to outline the extent of the recent floods, record the damage and document the response. Opportunities for any improvements that could reduce flood risk for local residents and businesses will be investigated.

The key findings are that an unusually wet May and June with rainfall up to 195% of the long term average, combined with an exceptional level of rainfall on 19 and 20 July created unprecedented levels of flow in the Aston, Bull Lane, Cote Ditches, and the wider and drainage system. Water levels and flows exceeded the capacity of culverts and bridges forcing flood water over and/or around the structures, into roads and residential areas. This caused flooding in areas of the village which was worsened by surface water flooding in places.

A number of positive recommendations are made with the objective of reducing the consequences of future flooding. The key recommendations of the review are:

- we will work with riparian owners to increase awareness of riparian landowner rights and responsibilities for watercourse maintenance
- we will continue with the current maintenance programme subject to resource availability
- we will continue to raise public awareness to improve the uptake and effectiveness of Flood Warning Direct – the free access to all, warning service
- we will continue to work with West Oxfordshire District Council (W.O.D.C) to prevent inappropriate development in the flood plain
- increased flood resistance and resilience of properties at risk from flooding via flood prevention products and construction techniques
- we will work with communities to produce local flood plans so they are better prepared for future flooding and better able to respond.

David McKnight Flood Risk Engineer

Contents

1Background

Introduction

Following the flooding of July 2007, we have undertaken a flood review to understand the meteorological conditions that contributed to the flooding, the mechanism of flooding and the number of properties affected in order to identify works to reduce flood risk and its impacts. This review will also identify responsibilities for flooding, and provide guidance on other flood risk management tools such as flood warning, flood resistant construction, and flood resilience. This review has been written in consultation with W.O.D.C.

Aston is a small village in West Oxfordshire approximately 6 km south of Witney. The Aston Ditch main river (See Glossary) passes the village western side, north to south and discharges into the Shill Brook and then the Great Brook approximately 1.5 km south of the village. The Bull Lane Ditch and Cote Ditch pass the eastern side of the village, running north to south and discharge into the Great Brook approximately 1.5 km south of the village. (See figure 3).

2 The problem

Flooding mechanism & history

Meteorology

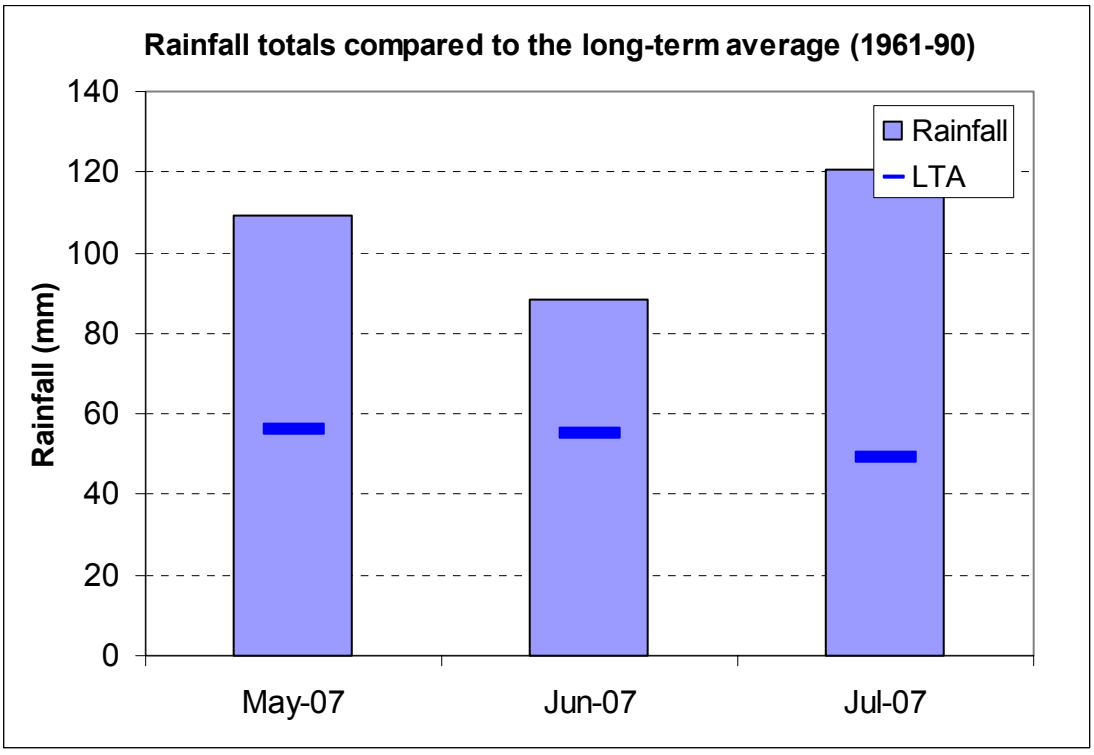
May and June 2007 were unseasonably wet months across the UK with many areas receiving rainfall above the long term average (LTA) for the period 1961-1990. The Thames Region received 109mm of rainfall in May and 88mm in June (195% and 160% of the long term average respectively).

The unsettled weather continued into July 2007 as low pressure dominated across the UK. This was due to the abnormal southerly position of the Polar Jet Stream, a narrow band of fast moving air in the upper atmosphere which steers weather systems from west to east across the Atlantic. The jet stream is usually further north during the summer period, allowing high pressure to form across the UK more frequently.

During 19 July 2007, low pressure across northern France deepened and tracked northwards, extending a vigorous trough and active frontal system across southern Britain on the 20 July 2007. This meeting of warm, moist air from the south and colder air from the north resulted in widespread torrential downpours across the region, particularly between 0900 and 1500 GMT.

In July the Thames catchment received 121mm compared to the long term annual average rainfall amount of 49mm (247% of the long term average), as illustrated in Figure 1. The Brize Norton rain gauge recorded 127 mm in 20 hours.

Figure 1: Rainfall totals compared to the long term average (LTA) (1961-90)

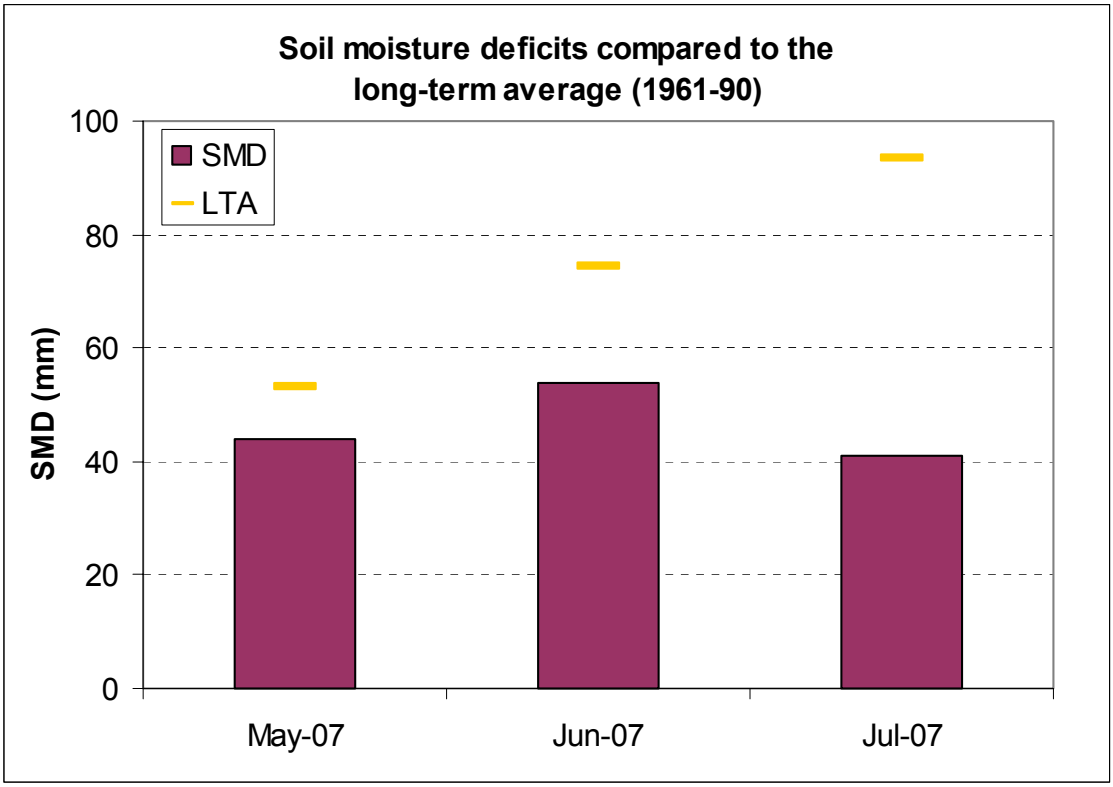


Hydrology

Soil Moisture Deficit (SMD) is a measure of the saturation of the soil. Low SMD means that the soil is wetter than usual, and SMD above the LTA means that it is dryer than usual. In Figure 2, the SMD in May and June 2007 are compared with long term averages for 1961-90. Extended periods of wet weather across much of the Thames Region resulted in lower than average SMD leading up to the July 2007 event. This means that less rainfall was needed for the soils to become fully saturated, increasing the potential for greater runoff into rivers.

The extremely high rainfall totals and intensities coupled with the low soil moisture deficits for the time of year caused flows (i.e. the volume of water in the river) at many locations to increase rapidly. By the end of July 2007 average monthly river flows at many sites were the highest on record for July.

Figure 2: Soil moisture deficits (SMD) compared to the long term average (LTA) (1961-90)



The combination of exceptional rainfall and low soil moisture deficit resulted in extremely high flow and levels in watercourses.

Flood history

There have been a number of major floods in the River Thames catchment since records began, most notably in November 1894, March 1947, October/November 2000 and January 2003. All occurred during the winter months and affected the upper Thames tributaries as well as the River Thames itself.

Historically, summer floods on the Thames and larger tributaries are less common. However it is interesting to note that the highest levels at Thames locks upstream of Oxford since records began in the 1880s were generally recorded in the flood of June 1903. Also, the July 1968 floods caused severe flooding in the lower Thames tributaries and the highest flows on record in the neighbouring lower Severn catchment.

Table 1 gives a summary of the main historic flood events that have affected similar areas to those in the July 2007 event. It is by no means a comprehensive record of every flood in the Thames catchment.

Table 1: Historic flood events

Date	Description
November 1894	Catchment-wide flooding in the Thames catchment. Highest levels downstream of Oxford since records began. Numbers of properties affected unknown.
June 1903	Flooding on the upper Thames. Highest levels locks upstream of the Cherwell since records began. Numbers of properties affected unknown.
March 1947	Catchment-wide flooding in the Thames, including the Lee catchment. Over 10,000 properties affected.
July 1968	Flooding in the mid to lower Thames and severe flooding in the Mole and Wey catchments. Approximately 10,000 properties affected.
November 1974	Flooding in the lower Thames and its tributaries including Addlestone Bourne, Blackwater, Beam, Loddon, Emm Brook.
Easter 1998	Flooding in the Cherwell catchment. Approximately 1000 properties affected
October/November 2000	Catchment-wide flooding in the Thames. Approximately 1100 properties affected.
January 2003	Catchment-wide flooding in the Thames. Over 500 properties affected.

The July flooding in Aston like many other areas was much worse than previous records we hold. The July 2007 flood event exceeded the recorded level on the River Thames for the 'Great Flood' of 1947.

Flood mechanism/source of flooding

The flooding in July was from several sources: rivers (fluvial), surface water (pluvial) and sewers. It is very difficult to distinguish the exact source of flooding due to the complex connection between rivers and drainage systems.

All of the areas considered in this review are subject to potential flooding from more than one source. The timing of flooding is often critical in determining the major causal factor in the flood. Exceptionally heavy rainfall can accumulate where it falls and this can cause flooding immediately.

The smaller the area these systems serve the more rapidly they will respond: the larger the area they drain, it will take a longer time for the majority of the rainfall to reach any point. Flooding will often occur in a time sequence that reflects this e.g. first we see a puddle in the garden, then overflowing drains, ditches overspill, small river floods then finally large rivers flood.

In July, properties flooded as a result of river flows exceeding the capacity of the channel, causing inundation of the flood plain. In some locations, high river levels prevented the discharge of surface water sewers and drains, which surcharged and caused flooding, or added to flooding from main river or ordinary watercourses.

The flooding of roads, roadside drains and gullies immediately after the exceptionally heavy rainfall from mid morning to late afternoon on Friday 20 July occurred due to insufficient capacity to cope with the volume of water. Many of the main roads connecting the villages were impassable by

Friday afternoon. The Aston Ditch, Bull Lane Ditch and Cote ditches and larger watercourses were already rising due to the runoff from fields and built development surface water drainage systems. The local drains and watercourses discharged into the larger watercourses which started to flood in the afternoon of Saturday 21 July. The local watercourses cover a large area with local variations in runoff rates, structures and catchment response to the rainfall, thus the timing of the various main rivers bursting their banks varied from location to location.

Our records indicate that 6 properties were flooded from the Aston Ditch (Western side of Aston). During the flooding, highway verges were cut open to help floodwater drain. Surface water/highway drains were also surcharging, which added further flood water to the locality.

We understand that no other properties in Aston flooded from rivers (fluvial flooding), however, it has been reported that 4-5 properties flooded from groundwater in the Manor Close/Bull Street area. A combination of foul water, surface water, including highway drainage backed up and flooded roads and surrounded properties in the vicinity of Bull Lane. This would have been partly due to the sheer volume of water overwhelming the capacity of drains and the level of flood water in the receiving watercourses and flood plains preventing the drains discharging.

It has also been reported that 1 property suffered from flooding from the Cote Ditch on the Cote Road.

Figure 3 in Appendix B shows our published flood plain outlines – (Flood Zones 2 & 3).

Planning controls and floodplain development

Current planning guidance contained in Planning Policy Statement 25 (PPS25 – published December 2006) states that flooding is a material planning consideration and explains how flood risk should be considered at all stages of the planning and development process. It places the onus on the developer to assess flood risk for a particular site and its impact on adjacent sites. It allows the planning authority to adopt the precautionary principle when determining planning applications within the floodplain.

We are a statutory consultee in the town and country planning process. We have provided local planning authorities with maps identifying the flood plains to guide development away from these areas.

Prior to PPS25, planning authorities were not obliged to incorporate our comments or advice into their final decision, this may in certain circumstances have resulted in development going ahead against our recommendations.

Under the 'Flooding Direction' issued in conjunction with PPS25, where a local planning authority is minded to approve a planning application for major development yet we have objected to it on flood risk grounds, the application must be referred to the appropriate Government Office to consider, on behalf of the Secretary of State, whether it should be called in for determination.

We will object to any inappropriate development within the floodplain that may result in:

- increased resident population in the floodplain;
- a loss of floodplain storage capacity;
- impede flood flows routes;
- result in increased flood risk elsewhere.

We are not aware of any other recently approved or proposed developments in the vicinity that may affect flood risk to the Aston. We continue to work with W.O.D.C. to ensure that flood risk is considered at every stage in the planning process.

We are also working with W.O.D.C. to produce their strategic flood risk assessment (SFRA). The purpose of an SFRA is to identify areas within a development plan that are at risk of flooding and make objective judgements on land allocations using a risk based approach as advised in PPS25.

Flood warning

We offer a free flood warning service that is open to all business and residents within flood risk areas. This involves sending a warning via phone, fax, text or email. There are 4 flood warning codes:

Flood Watch
Flooding is expected. Be aware! Be Prepared! Watch Out!

Flood Warning
Flooding of homes, businesses and main roads is expected. Act now!

Severe Flood Warning
Severe flooding is expected. Extreme danger to life and property. Act now!

All Clear
Issued when flood watches or warnings are no longer in force. Check all is safe to return. Seek advice

We can provide a flood warning service using a variety of forecasting techniques. This is only possible where we are able to monitor river levels.

When a river comes out of banks, we will issue a flood watch. This means that flooding of low lying land is expected. From a land survey, we can also establish the lowest and nearest property to the river (and therefore the first to flood). When we are aware that property flooding is going to occur, we will issue a flood warning. A flood warning will be elevated to a severe flood warning if the situation worsens and over 100 properties and or major infrastructure will be flooded.

To issue our warnings we have a 24-hour flood warning service called Flood Warnings Direct (FWD). We encourage members of the public who are at risk from flooding can register with us. Our professional and media partners are also all registered to receive warnings via FWD. FWD is also used to update our Floodline telephone service and our website. Our professional partners includes emergency planning officers from Local Authorities, emergency services and utility groups.

Currently our flood warning areas are quite large and include long stretches of river which cover several towns or communities. Over the next two years we will be reducing the size of our flood warning areas into smaller areas. This will enable us to issue more accurate flood warnings.

In past years we have also made use of flood wardens as a method of warning people of imminent flooding. Flood wardens were volunteer residents who would help us issue messages to those members of the public who were not registered with FWD. However as more and more people have signed up to FWD, we no longer use flood wardens in the same way. Instead, a warden's role has become more of a neighbourhood advisor and we now encourage communities to produce their own self help community flood plan.

Floodline (not to be confused with Flood Warnings Direct – FWD) is our 24 hour telephone information service. When people are warned or become aware that a flood warning is in force, they should phone Floodline. They will then be able to hear what is happening locally in terms of river and flooding forecasts. When calling Floodline, the public need to know a second quick dial number which will take them to their local area information. For Aston, the relevant quick dial code is: 0111221.

Warnings issued

The first ‘flood warning’ was issued on 20 July 2007, once river levels had started to respond to the rainfall, and the first ‘severe flood warning’ was issued on the 21 July 2007. The last ‘all clear’ was issued on 6 August 2007.

The “at risk” residents in Aston fall within the River Thames flood warning area (flood warning area: St Johns Lock at Lechlade to Eynsham Lock near Oxford). Residents from Aston who have registered to Flood Warnings Direct will have received a flood watch on Thursday 19 July 2007 for the River Thames. On Saturday 21 July 2007, a flood warning was issued for the above flood warning area (River Thames). However, there are only a few properties shown on our published flood plain outlines as shown in Appendix B – Figure 3 and therefore only these properties would have received warnings.

We can currently offer a full flood warning service to some areas along the length of the River Thames level gauges to forecast flooding. However, this is not possible for the majority of the River Thames tributaries including the Aston, Cote or Bull Lane Ditches which affect flood risk to Aston.

The reason for this is that at the current time we do not have flood warning level gauges anywhere on the Aston, Cote or Bull Lane Ditches so are unable to forecast accurately for property flooding in areas that these watercourses affect.

This means that currently, residents at risk of flooding Aston are only able to be registered to FWD to receive warnings for the River Thames.

3 Management of flood risk

Catchment flood management plan (CFMP)

Catchment flood management plans (CFMP's) provide an overview for managing the long-term flood risk over the next 50 to 100 years.

A reliance on flood defence is no longer sustainable and we are moving towards managing the risks of flooding. This can be achieved by putting in place a range of flood risk management policies that can react to change.

Aston lies within the undeveloped natural flood plain catchment area as defined by the CFMP. The approach to flood risk management in these areas is about working with the natural characteristics of the catchments. The aim is to manage flood risk by taking opportunities to maximise the potential of the flood plain to retain water. Specifically the messages are:

- The flood plain is our most important asset in managing flood risk
- Maximising the capacity of the flood plain to retain water in these areas can have many advantages for people and the natural environment
- Managed flooding of some areas of the natural flood plain will reduce the risk to some communities
- We will do all that we can to prevent inappropriate development which reduces the capacity of the flood plain to retain water. Future maintenance work on river channels should aim to increase the capacity of the flood plain.

Third party structures & maintenance

There are no sluice gates or mills in operation on the watercourses in the area which could affect flood risk to Aston.

Maintenance regime

The maintenance of all watercourses is legally the responsibility of the owner of the river (riparian owner). Many households own very small sections of the various watercourses and in many cases are also unaware of their responsibility for the watercourse. W.O.D.C. are currently working through a programme of minor flood defence work which involves identifying ditch and ordinary watercourse landowners and requesting maintenance if required.

All rivers, streams and ditches forming the natural drainage system fall into two categories. They are: main river and ordinary watercourses. We are the operating authority for all main rivers. W.O.D.C. are the operating authority for ordinary watercourses and has similar powers to us but only for Ordinary watercourses. Oxfordshire County Council Highways Department are responsible for the maintenance of structures that they own, this will generally include road culverts, bridges, gullies and some ditches.

We have permissive powers to carry out maintenance on any river that is classed as main river. Our maintenance role is scheduled on the basis of flood risk priority and resources. The primary main rivers that cause flood risk to Aston are the Aston, Cote End and Bull Lane Ditches.

We support riparian owners wishing to undertake maintenance of watercourses, subject to them gaining our consent where this is required. Our support could include guidance and advice on various aspects of maintenance. Further information and advice relating to the need to gain our consent can be obtained from our National Customer Contact Centre on: 08708 506 506.

Details of the rights and responsibilities of riparian landowners are provided on our website:

http://www.environment-agency.gov.uk/subjects/flood/362926/

The same information is also available on request from us in a hard copy booklet entitled 'Living on the Edge'.

We do not give a risk score to each watercourse, instead we categorise the flood risk management system in which it sits. The main rivers locally sit within the Radcot Cut system, which was first assessed in 2005, and reviewed in 2007. Since 2005 the Radcot Cut System has been categorised as a high risk system, however from April 2008 when assessed against flood risk, this system will be categorised as a medium risk system. This is due to the total number of properties within the flood plain and the risk to life compared to other areas. Every year we aim to undertake work in all high risk systems and some medium risk systems. In some areas we are reconsidering the classification in light of the July floods, the Radcot Cut is one of these.

Our assessment of the main rivers in this area is that whilst increased maintenance could lead to reductions in the water levels during very minor flood events it would not have helped during the floods in July 2007 due to the scale of the flooding and volume of water involved.

The Cote Ditch (main river) was de-silted in October 2006, from the Great Brook upstream to the Bull Lane Ditch. This work is planned on a rolling 3 year cycle as the benefits derived from the previous de-silt will be sufficient until then.

Our operatives arrange ad-hoc clearances of blockages on the Aston Ditch and make annual assessments of the silt levels.

We have recently undertaken maintenance work on the Great Brook, from Isle of White Bridge on the Buckland Road to the next road bridge in Chimney. This work consisted of fallen tree removal and bank side vegetation clearance.

Intervention options

Our aim is to reduce flood risk. For defended areas at flood risk we will inspect, maintain and improve flood risk management assets, on main rivers and the coast on the basis of risk (i.e. the likelihood and consequences of failure). In undefended areas we build and maintain assets where it is considered to be an appropriate use of our flood risk management resources and meets our risk-based criteria, subject to availability of funding.

Our decisions consider the long term view of the economic, social and environmental impacts of an area at risk from flooding, generally on a river catchment basis. We look at a hundred year timescale (including an allowance for climate change), when carrying out extensive studies to assess, not only the physical and environmental impacts, but the overall costs and benefits of a scheme.

We consider a wide range of options to determine the best social, environmental and economic outcome for reducing flood risk. However we cannot construct flood alleviation schemes at every location and we target investment at greatest need.

In assessing the viability of our schemes, we will always consider the resultant impacts on flood risk elsewhere.

There are a number of large scale engineering solutions that can be employed to protect against flooding. These have been outlined below but not looked at in detail due to the likely benefits when compared to the costs of a scheme:

- Flood Storage Areas can be part of the existing flood plain or on the edge of the flood plain. They are areas of land that can be excavated to provide increased flood storage capacity to reduce flood water levels elsewhere.

- Bypass Channels can divert the flood water via an additional channel away from existing development therefore reducing flood risk.

- Increasing the capacity of channels and structures can reduce flood water levels and therefore flood risk to existing development. This is achieved by removing restrictions such as bridges or culverts or by enlarging watercourses. The effect is that flood water levels are lowered locally by increasing the flow capacity downstream.

Through our investigations, we have not been able to justify any engineering options for flood defence works for Aston. The above types of schemes would not be viable here due to the high costs involved and the small number of properties that would benefit.

We understand the primary cause of flooding in this area was field drainage runoff with subsequent flood flow routes across farmland towards the larger watercourses (Aston, Cote and Bull Lane Ditches) in the village. The magnitude of the July flood event exceeded the capacity and overwhelmed the surface water and land drainage systems, culverts and bridges. This caused flooding greater than previous records.

W.O.D.C. have commenced their flood reports for the area and have also been working with riparian land owners to guide maintenance works and advise on land drainage responsibilities.

Historic works

There are currently no flood alleviation schemes in place for Aston as previous floods have not been severe enough to affect property here. The flood map shown in Appendix B confirms that the majority of properties in Aston lie outside of the published flood plain extent.

Flood resilience

Flood resilience refers to measures that reduce the amount of damage caused by water entering properties. There are a wide range changes that can be made to a property and any changes would be very specific to each property in order to ensure that they are suitable.

At present the our policy is not to provide financial assistance with any protection to individual properties, however the Department for Environment Food and Rural Affairs (DEFRA) are currently funding a pilot grant scheme to encourage flood resilience as part of the Making Space for Water strategy. The outcome of this study could influence the decision of householders in the future.

In Aston it is unlikely that flood defences can be provided for the homes at risk of flooding. Individual flood protection and flood resilience measures are recommended.

In general if such measures are installed as part of repairs after the recent floods then insurance companies will expect the householder or business to meet the extra costs themselves. Possible measures include:

- Raised cupboards & electrical circuits
- Water resistant door frames
- Non-return valves on drainage pipes
- Water resistant plaster
- Air brick covers
- Tanking (waterproofing internal walls).

Flood defence products for individual properties are also widely available and we support the BSI kite mark standard which signifies that the product has been rigorously tested. See ‘references’ for links to further information.

Community flood plans

Following the July flooding we are working with affected communities to produce their own flood plans. We can assist by providing flooding advice, supplying maps and other relevant information. They can also be adapted to include other emergency situations, thus increasing the resilience of a community. The community flood plan contains information on:

- Setting up emergency management teams
- Flood event procedures
- Communications – useful numbers, local media, Environment Agency
- Flood Maps including vulnerable properties & residents
- Key community skills & equipment
- Emergency accommodation.

4 Conclusions & recommendations

The floods of July 2007 were an exceptional event, particularly in terms of the rainfall and the catchment response. The widespread flooding experienced was caused by the volume of water and inability of the overloaded drainage systems including, drains, ditches, streams and rivers to convey the flood water.

Examination of the rainfall data and river flows from the July flood event has enabled an estimation of the return period of the flood. Flows and levels in the main rivers in July 2007 have been estimated as having a return period in excess of 1 in 100 years. The flooding was worse than previous records and inundated residential and commercial areas and properties that lie outside of the flood plain.

We worked with our professional partners throughout the flood event to ensure that residents and businesses were warned and then assisted where possible. The main physical structures that affect flood flows are road culverts, bridges and build development. These structures would have affected the way in which the floodplain operated but were not directly responsible for the flooding in the locality as the watercourses would have already been under capacity due to the volume of water.

Increased channel maintenance would not have significantly reduced the level of flooding experienced due to the volume of flood water. Increases in channel capacity would provide limited reduction in flood risk. This is because the extra volume in the channel only equates to a very small proportion of the volume of water in the flood plain. However, it is recognized that channel maintenance will assist in flood risk reduction for smaller flood events and we will continue to work with landowners to offer guidance and advice.

In order to reduce the impact of any future floods there are several actions that should be taken forward as a matter of priority:

- we will work with riparian owners to increase awareness of riparian landowner rights and responsibilities for watercourse maintenance
- we will continue with the current maintenance programme subject to resource availability
- we will continue to raise public awareness to improve the uptake of Flood Warning Direct – the free access to all, warning service
- being prepared - both at community (community flood plans) and householder level
- our continued role in the planning process – objecting to inappropriate development in the flood plain
- increased flood resistance and resilience for homes and businesses.

Appendix A – Maps

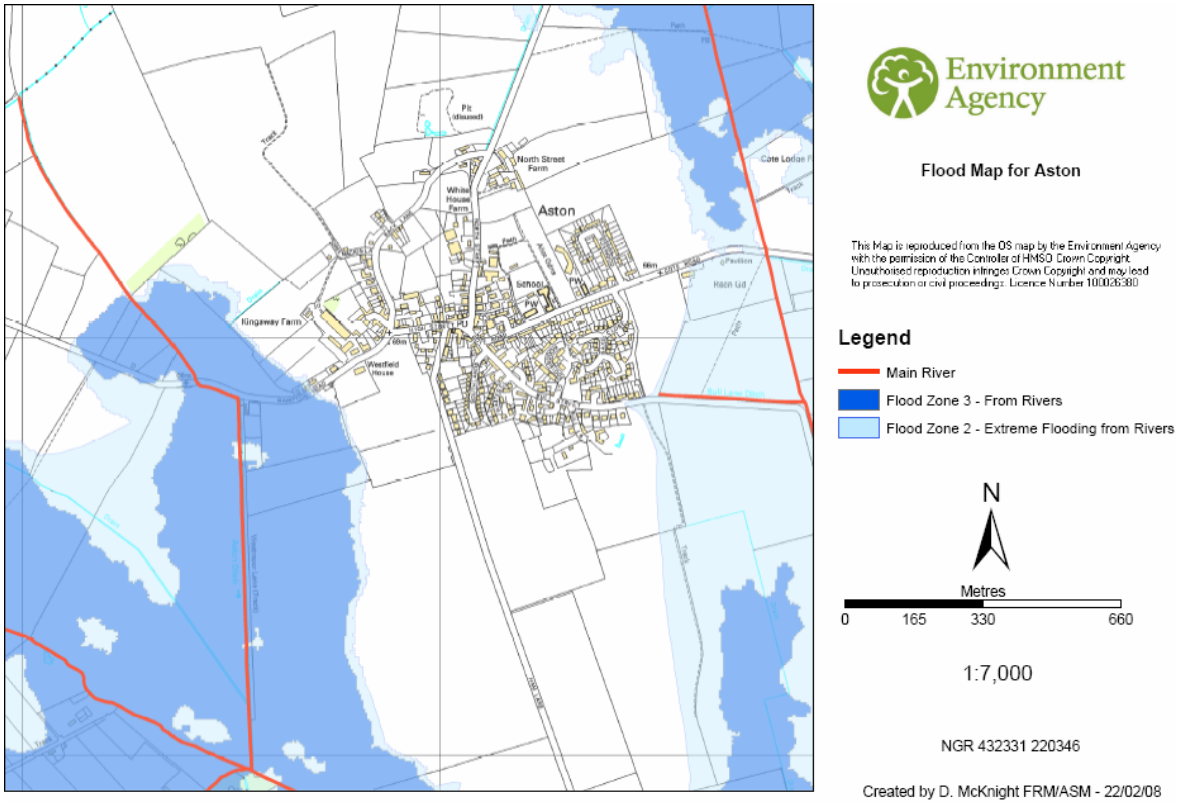


Figure 3 – Aston –Flood Zone 3 (1% annual probability of occurrence) and FZ2 (0.1% annual probability of occurrence)

Glossary of terms

Cost Benefit Analysis
In order to receive funding for a flood defence scheme an analysis must be made of the costs and benefits. The costs include the design, construction and maintenance over a 100 year period. This is compared against the benefits – i.e. the reduction in damage caused by flooding of properties in financial terms. The higher the ratio of cost to benefit the more likely the scheme is to gain funding due to the national prioritisation of flood risk capital funding.

Critical Ordinary Watercourse
These are ordinary watercourses which have been identified by DEFRA as being strategically important and are to be enmained.

Culvert
A closed conduit for the conveyance of water, e.g. a pipe underneath a road.

Enmained
Procedure in which the Environment Agency assumes powers to legally chance the classification of an Ordinary Watercourse to a Main River in order to maintain exercise its Permissive powers for maintenance, flood warning and flood alleviation works.

Flood plain
A flood plain is an area of land over which river or sea water flows or is stored in times of flood. A flood plain can extend beyond the land immediately adjacent to a watercourse. (Living on the edge)

Flood Zone
Flood Zones are the Environment Agency's nationally agreed geographical layers of information that define the extend of flood risk. They are split into Flood Zone 1, 2 and 3.
Flood Zone 2 is flooding from rivers without defences at a 1% (1 in 100) chance of happening each year. It is the natural flood plain area that could be affected in the event of flooding from rivers.
Flood Zone 3 is the outline of a flood extent in an extreme flood with a 0.1% (1 in 1000) chance of happening each year.

Flood storage area
A flood storage area is a part of the flood plain that allows flood waters to be temporarily stored. The purpose of such an area is generally to retard larger floods from reaching a main watercourse for a designed flood return period.

Fluvial Flooding
Flooding where the source is river water.

Land Drainage Scheme
Post World War II the emphasis in river engineering was on increasing the farming capacity of the UK. This was achieved through land drainage schemes that increased the quality of farmland by maximising the drainage of water.

Main rivers
Main rivers are defined under the Water Recourses Act 1991, they are usually larger streams and rivers, but also include smaller watercourses of strategic drainage importance. A main river is defined as a watercourse shown as such on a main river map, and can include any structure or appliance for controlling or regulating the flow of water in, into or out of the main river. The Environment Agency's powers to carry out flood defence works apply to main rivers only. Main rivers are designated by the Department for Environment, Food and Rural Affairs in England (DEFRA) and by the Welsh Assembly Government. (Living on the edge)

National Flood and Coastal Defence Database (NFCDD)
The National Flood and Coastal Defence Database is a central store for Flood Risk Management related data. It aims to allow rapid access to national data, stored and maintained in a consistent manner.

Ordinary watercourse
An ordinary watercourse as defined under the Land Drainage Act 1991 is every river, stream, ditch, drain, cut, dyke, sluice, sewer (other than public sewer) and passage through which water flows which does not form part of a main river. On ordinary watercourses, the local authority and, where relevant, Internal Drainage Boards (IDB) have similar permissive powers as the Environment Agency has on main rivers. (Living on the edge)

Pluvial Flooding
Flooding where the source is surface water.

Priority Score
The national scoring system that is used by the Environment Agency and DEFRA to prioritise the capital funding of flood defence schemes.

Professional Partners
Professional partners are organisations we work with. Specifically, the emergency services, local authorities, health bodies, utilities, transport bodies and other Government agencies.

Public Surface Water Sewers
The sewerage undertaker is responsible for maintaining surface water sewers that are vested in them. Surface water sewers are likely to go directly into a watercourse.

Roadside Ditches and Highway Drainage
The County Council as Highway Authority is responsible for draining those highways, which are county roads, and has responsibility for certain bridges and culverts, under the Highways Act 1980. In general terms, it is usual for the roadside ditches to be the responsibility of the adjoining landowner; exceptions to this rule are where the ditch was constructed to drain the highway or where it falls within the land owned by the highway authority.

Riparian Owner
The owner of the river in terms of property. The usual situation is for the landowner of each bank to own up to the centreline of the river. There are responsibilities and rights associated with owning the river – principally that of maintenance of the watercourse and associated structures.

Sewer
Includes all sewers and drains which are used for the drainage of buildings and yards appurtenant to buildings, excluding a drain used for the drainage of a single building or of buildings within a single curtilage.

Trash Screen
A grill or grate that is installed on a culvert or other limited opening on a river to collect debris and prevent blockages.

List of abbreviations

AOD	Above Ordinance Datum
BSI	British Standards Institute
CFMP	Catchment Flood Management Plan
COW	Critical Ordinary Watercourse
DEFRA	Department for Environment, Food & Rural Affairs in England
FSA	Flood Storage Area
GMT	Greenwich Mean Time
NFCDD	National Flood and Coastal Defence Database
LTA	Long Term Average
LPA	Local Planning Authority
PPS25	Planning Policy Statement 25
RICS	Royal Institute for Chartered Surveyors
SMD	Soil Moisture Deficit

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Environment Agency – Thames Region - Aston, July 2007