

February 2015

Buckinghamshire County Council

Flood Investigation Report

Chalfont St Giles, March to April 2014



February 2015

Revision Schedule

Buckinghamshire County council Flood Investigation Report

Rev	Date	Details	Author	Checked and Approved by
1	06/01/2015	Draft	Alex Back	Karen Fisher
2	08/01/2015	Final Draft	Alex Back	Karen Fisher
3	03/02/2015	Final	Alex Back	Karen Fisher

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Executive Summary

This report has been produced by Buckinghamshire County Council (BCC) to investigate the flooding that occurred in Chalfont St Giles during March and April 2014. The report provides details of the event and makes recommendations for Risk Management Agencies (RMAs) to undertake to prevent a repeat in the future.

A Section 19 Investigation is a statutory requirement for Lead Local Flood Authorities (LLFA) under the Flood and Water Management Act (FWMA) 2010. On becoming aware of a flood in its area, the LLFA must, to the extent that it considers it necessary or appropriate, investigate:

- Which RMA have relevant flood risk management functions; and
- Whether each of those RMAs has exercised, or is proposing to exercise, those functions in response to the flood.

It was deemed necessary to produce this report as the flood event in Chalfont St Giles exceeded BCC's criteria for carrying out a Section 19 Investigation.

The aim of the Section 19 Investigation is to give an explanation of what happened in the flood event and what were the RMAs' responsibilities during the event. The recommendations are there to help the RMAs learn lessons from the event and to move forward with management of the flood risk in the future.

The flooding in Chalfont St Giles during the spring of 2014 was caused by exceptionally high groundwater levels within the chalk aquifer. The groundwater flooding affected the local critical infrastructure; both the Affinity Water pumping station and the British Telecom (BT) telephone exchange were impacted by the flooding along with the main access road to the shops in the center of the village. If the recommendations are completed this will reduce the impact of any future flood events.

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1. Introduction

1.1 Background to investigation

BCC as the LLFA has a responsibility to record and report flood incidents as detailed within Section 19 of the FWMA 2010:

Section 19

- (1) On becoming aware of a flood in its areas, a lead local flood authority must, to the extent that it considers it necessary or appropriate, investigate-
 - (a) which risk management authorities have relevant flood risk management functions, and
 - (b) whether each of those risk management authorities has exercised, or is proposing to exercise, those functions in response to the flood.
- (2) Where an authority carries out an investigation under subsection (1) it must-
 - (a) publish the results of its investigation, and
 - (b) notify any relevant risk management authorities.

BCC has established criteria for section 19 flood investigations which can be found in the appendix.

It was deemed necessary to complete an investigation into the flood incident in Chalfont St Giles because it meets the following threshold:

- Flooding of 1 or more commercial premises and flooding of critical infrastructure.

During the event in Chalfont St Giles internal flooding of four commercial premises and flooding of the BT telephone exchange which is classified and critical infrastructure occurred.

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1.2 Site Location

Chalfont St Giles is a large village in the Chiltern District to the south of the county as shown in Figure 1a. The locality affected by the flood incident was the High Street and is shown in Figure 1b.

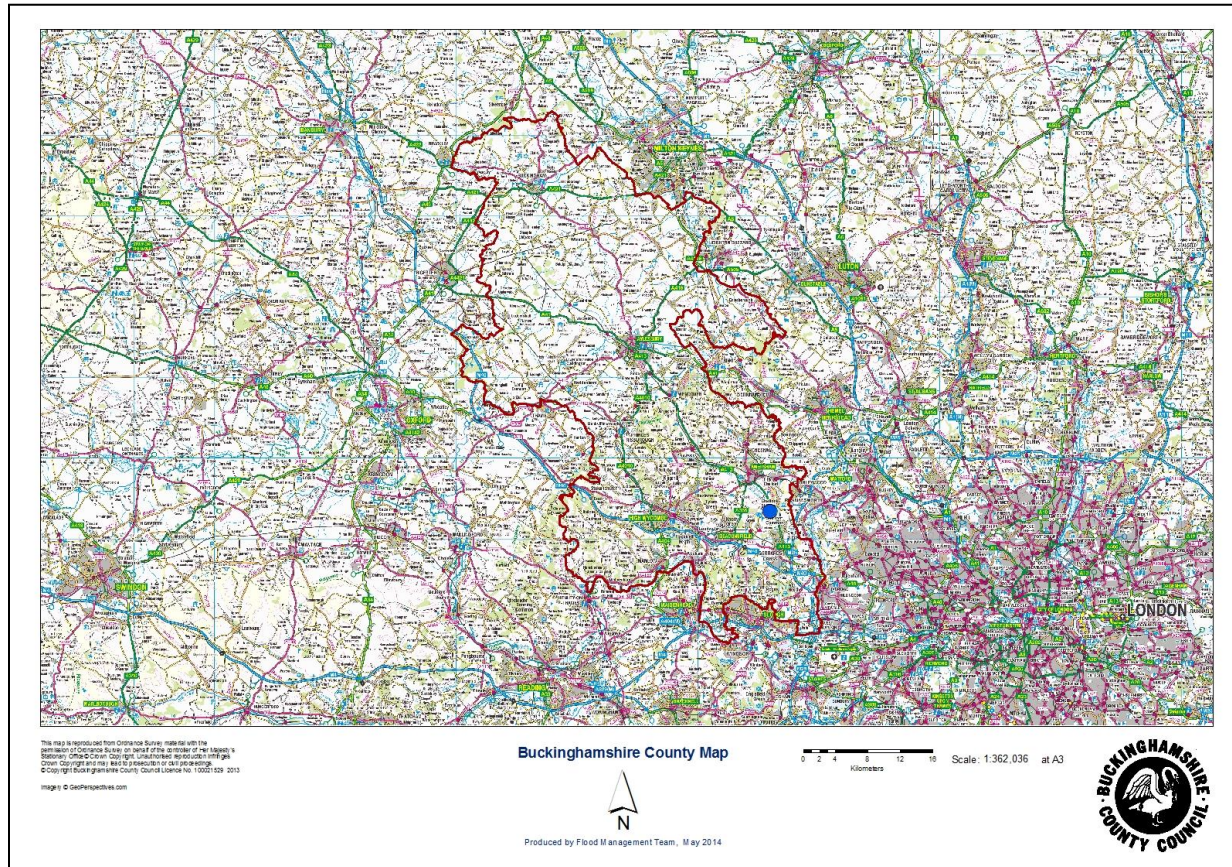


Figure 1a County Level View of Chalfont St Giles (Ordnance Survey License 100021529 2014)

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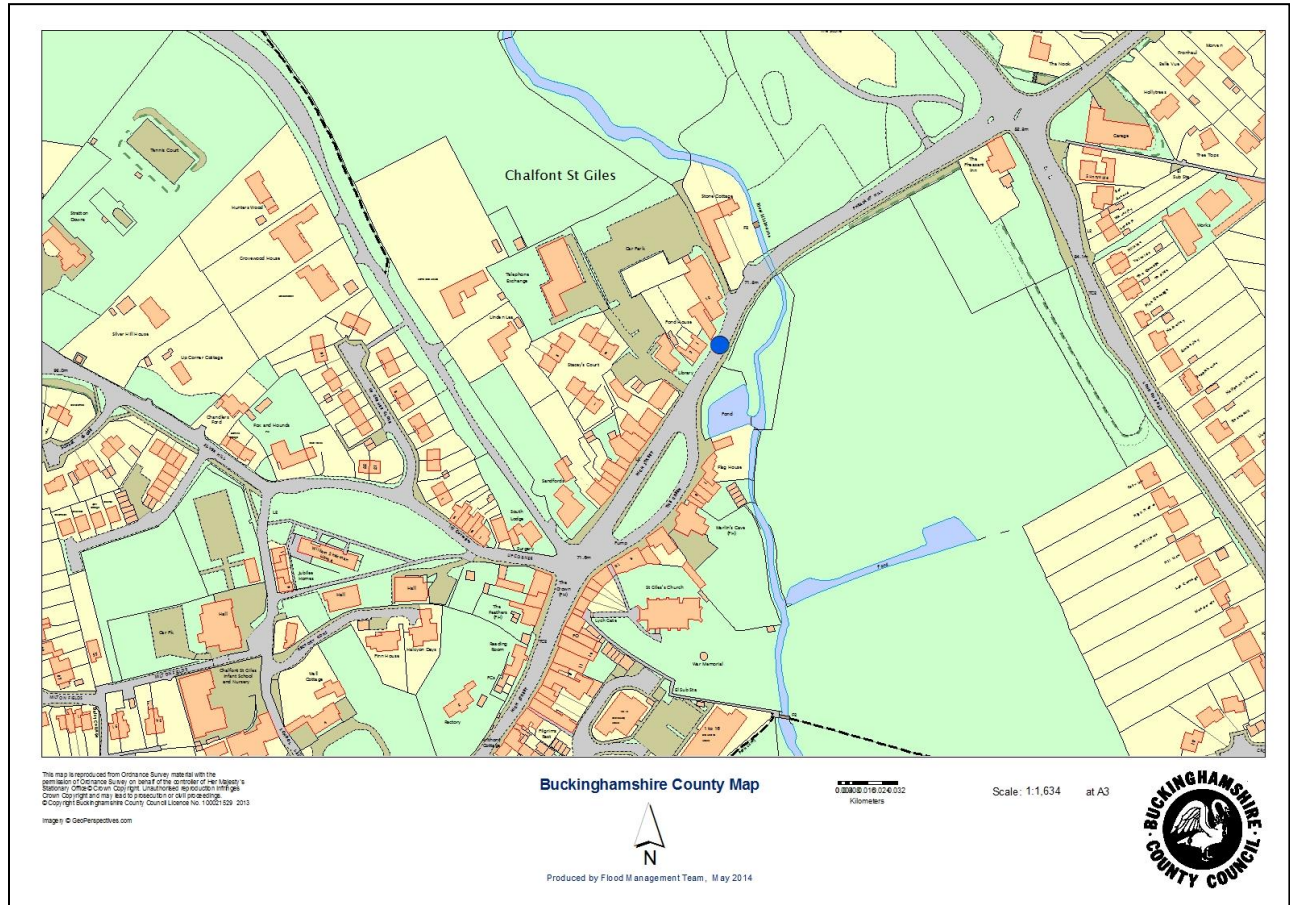


Figure 1b Local level view of Chalfont St Giles (Ordnance Survey License 100021529 2014)

1.3 Drainage system and river network

The River Misbourne is a main river that flows through Chalfont St Giles, as shown in Figure 2. It is a chalk stream that flows for 17 miles (27 km) from Mobwell Pond just north of Great Missenden to its confluence with the River Colne, which itself is a tributary of the River Thames. Apart from a small section in Great Missenden, the River Misbourne is classed as a main river. The Environment Agency (EA) is the RMA for the main river section, as defined in section 4.3. The Environment Agency has powers to work on main rivers and the sea to manage flood risk.

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Figure 2: The River Misbourne (Source: Chilterns Chalk Streams Project)

The surface water drainage in Chalfont St Giles, shown in Figure 3, is owned and maintained by Transport for Buckinghamshire (TfB). Figure 3 also shows the gravity sewer network, grey lines, which is owned and maintained by Thames Water.

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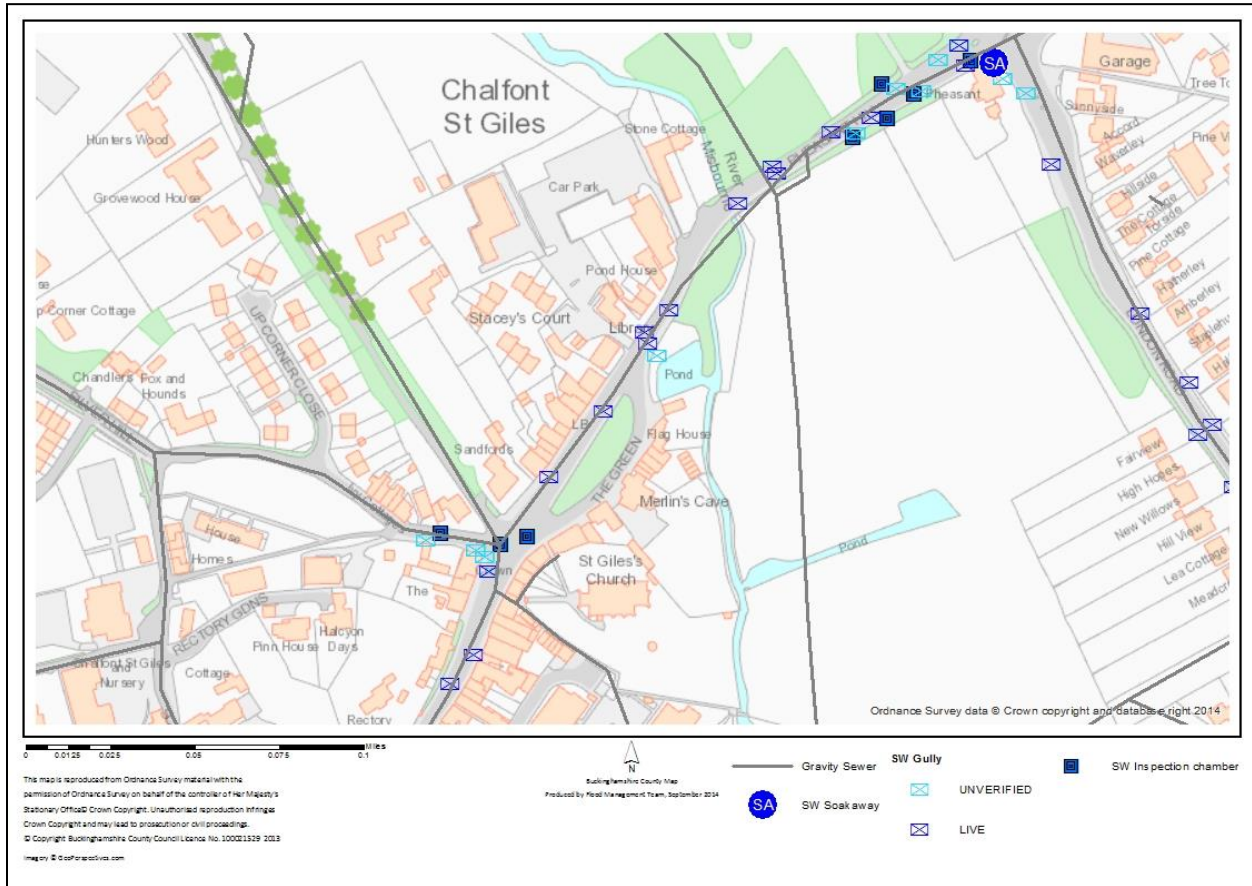


Figure 3 Map of the assets (Ordnance Survey License 100021529 2014)

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2. Background

2.1 Catchment characteristics

The River Misbourne is a main river, as designated on the main river map produced by the EA. Figures 4 and 5 below show the fluvial and surface water flood maps for the village.

The fluvial flood map (Figure 4) shows the flooding which would occur from the main river in a 1 in 100 year (medium blue) and 1 in 1000 year (light blue) event. The flood water in these situations would come from the river and flow out onto the impacted areas shown on the map.

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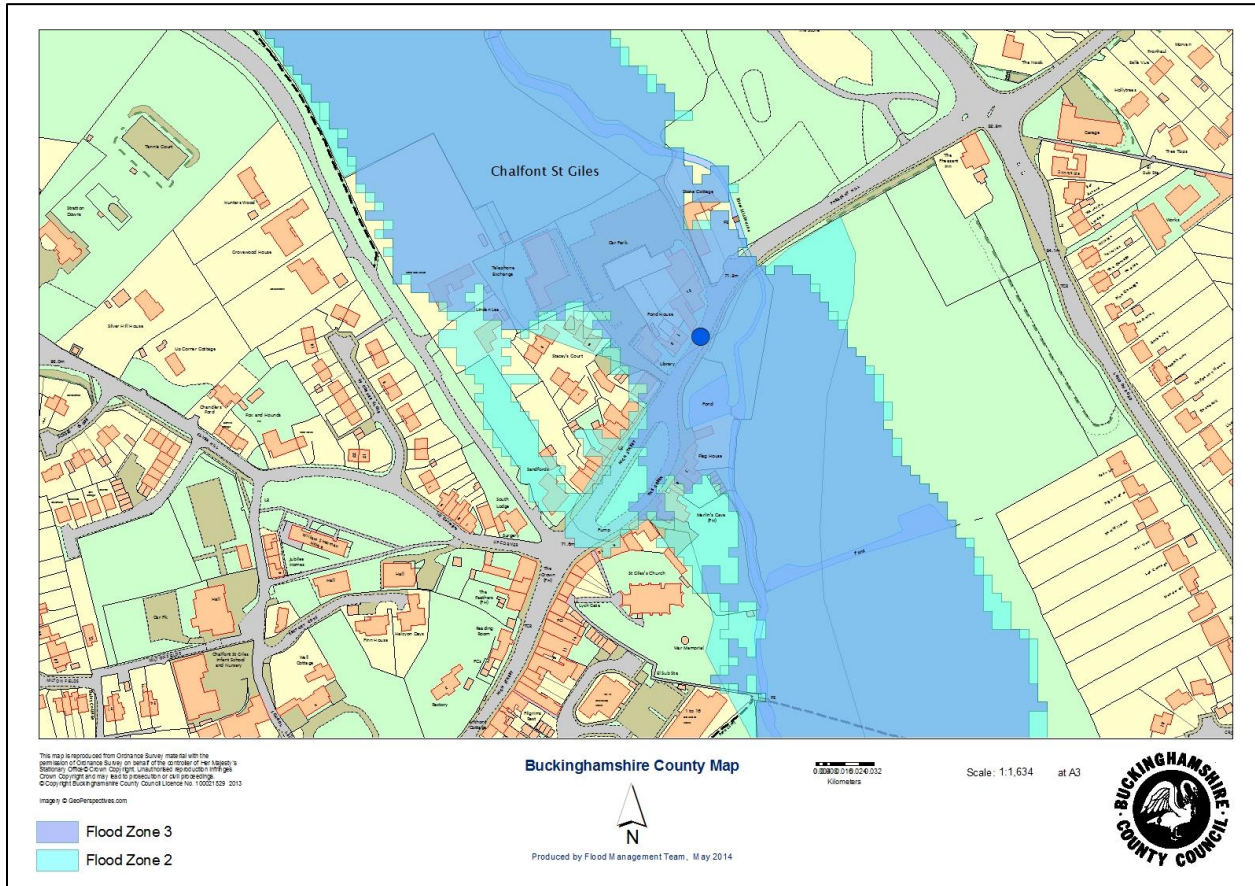


Figure 4 Map of fluvial flooding (Ordnance Survey License 100021529 2014)

The surface water flood map (Figure 5) shows the extent of flooding in the 1 in 30, 1 in 100 and 1 in 1000 year events for the area surrounding Chalfont St Giles. Surface water flooding occurs when extreme or prolonged rainfall cannot infiltrate into saturated ground, or flow into the rivers and/or highways drainage due to high volumes of water.

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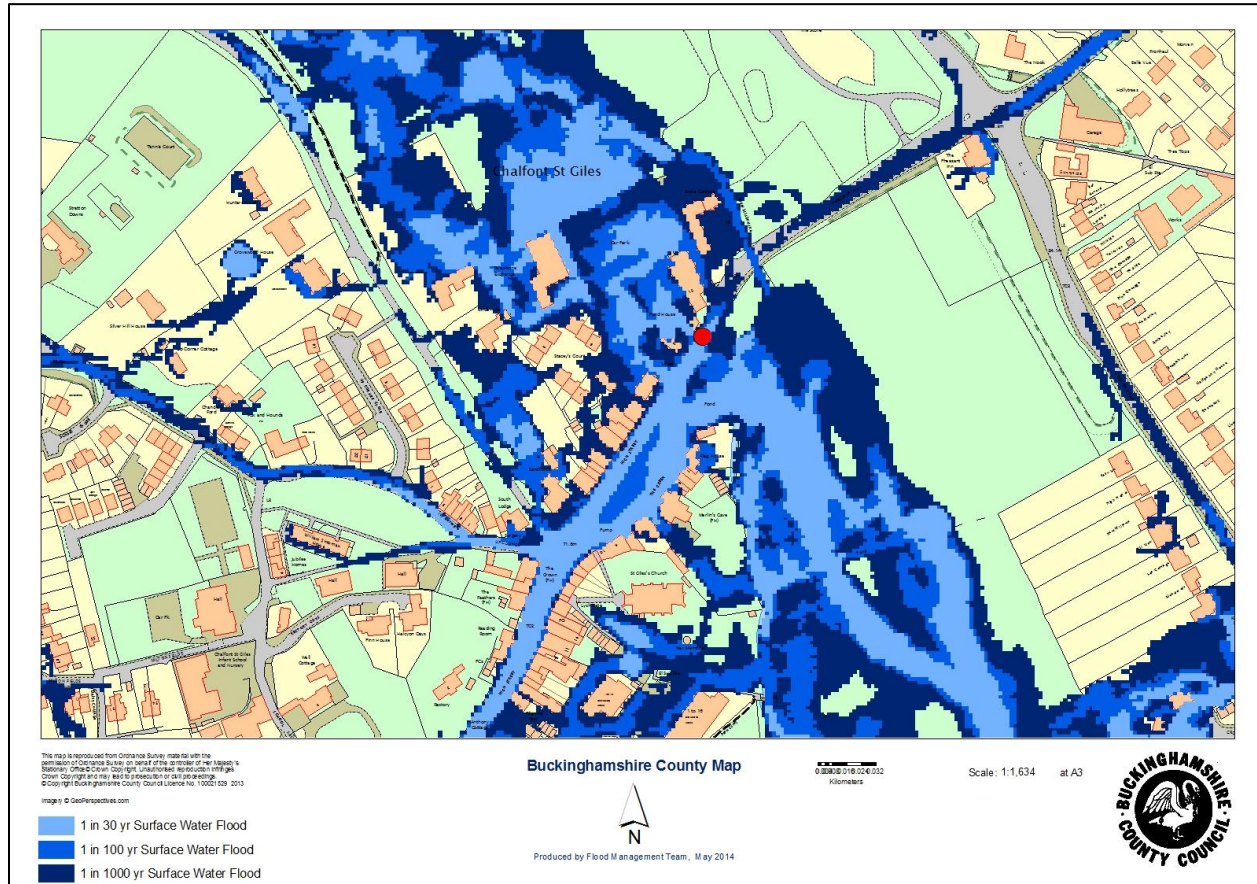


Figure 5 Surface water (Ordnance Survey License 100021529 2014)

These maps show that the surface water and fluvial extents are very similar and that there are a number of commercial and residential properties which are at risk along with the road (Pheasant Hill/High Street).

Chalfont St Giles is situated on Beaconsfield gravel (sand and gravel) along the line of the Misbourne. The solid geology is Seaford and Newhaven chalk as shown in figure 6. The valley of the River Misbourne at Chalfont St Peter slopes from 85-90mAOD either side of the village down to 71mAOD where the river flows through the village. The result of this is that the valley is effectively funneling water from the chalk aquifer, surface water and fluvial flow into the valley bottom and therefore the center of the village.

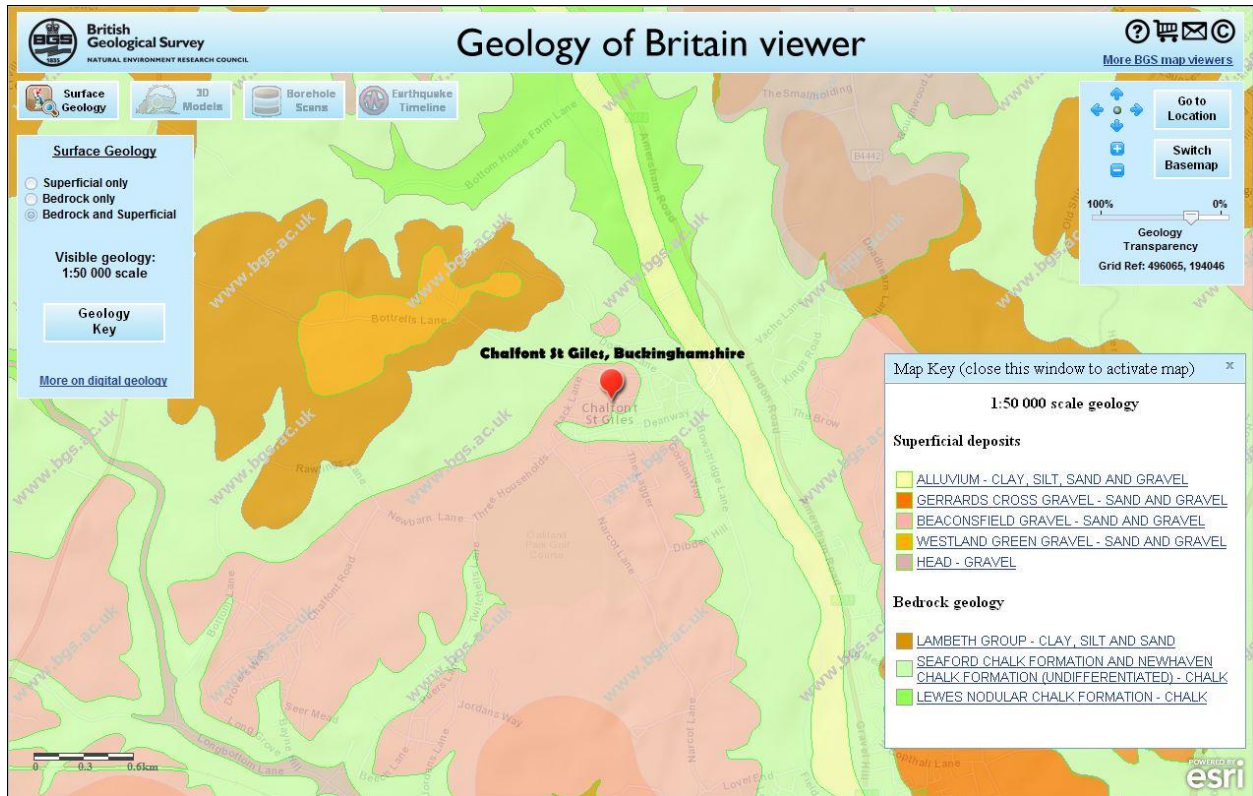


Figure 6 Geology map for the Chalfont St Giles area (British Geological Survey, 2014)

2.2 Previous flood events

The two tables below summarize the recorded flood incidents within Chalfont St Giles in recent history as recorded by the County and District Councils these are detailed in the Preliminary Flood Risk Assessment for the county.

Chalfont St Giles Past Floods (PFRA, 2011)

Table 1: Chiltern District Council drain flooding incidents

Ref. No.	Easting	Northing	ADDRESS1	ADDRESS2	Date	Recorded No of Incidents	Flooding Source
ChD-13	498215	195288	BOTTOM HOUSE FARM LANE	CHALFONT ST GILES	15/02/2007	1	Surface Water
ChD-14	498339	193660	BOTTRELLS LANE	CHALFONT ST GILES	24/01/2007	2	Surface Water
ChD-36	500413	193854	GORELANDS LANE	CHALFONT ST GILES	18/01/2007	1	Surface Water
ChD-72	498442	192784	NARCOT LANE	CHALFONT ST GILES	27/11/2006	1	Surface Water

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ChD-74	499666	195623	NIGHTINGALES LANE	CHALFONT ST GILES	10/01/2007	2	Surface Water
ChD-98	498648	193057	THE LAGGER	CHALFONT ST GILES	07/12/2006	1	Surface Water
ChD-101	499109	193436	TOWNFIELD LANE	CHALFONT ST GILES	23/11/2006	1	Surface Water

Table 2: Chiltern District Council Area Technician Records (Chalfonts) - provided by Transport for Buckinghamshire

Ref. No	Road	Town	Location	Class	Problem	Risk	Requirements
ChA-1	Amersham road	Chalfont St Giles	outside a property called Ebbtide Lodge	A413	Possible collapse in pipe at 2 locations adjacent to gullies and a damaged kerb weir	High Street - switch off area	Investigate collapses by excavation.
ChA-2	Nightingales Lane	Chalfont St Giles	outside a property called Longacre	B4442	Borehole not working	High	REBORE
ChA-3	Nightingales Lane	Chalfont St Giles	Outside Five Diamonds	B4442	Draincare unable to clear blockage possible root damage.	Medium	Further investigation with camera and possible excavation.
ChA-4	Nightingales Lane	Chalfont St Giles	Opposite Wellmans	B4442	System cleaned out and flowing ok but collapse in last gully on separate line	Low	Excavation to investigate.
ChA-6	Roughwood Lane	Chalfont St Giles	on bend o/s Roughwood Fields	MC34	4 Gullies silted and blocked.	Medium	WO: 897535 raised on 12/8/10 for reactive gully machine to clean and check system. 2 man stop/go required.

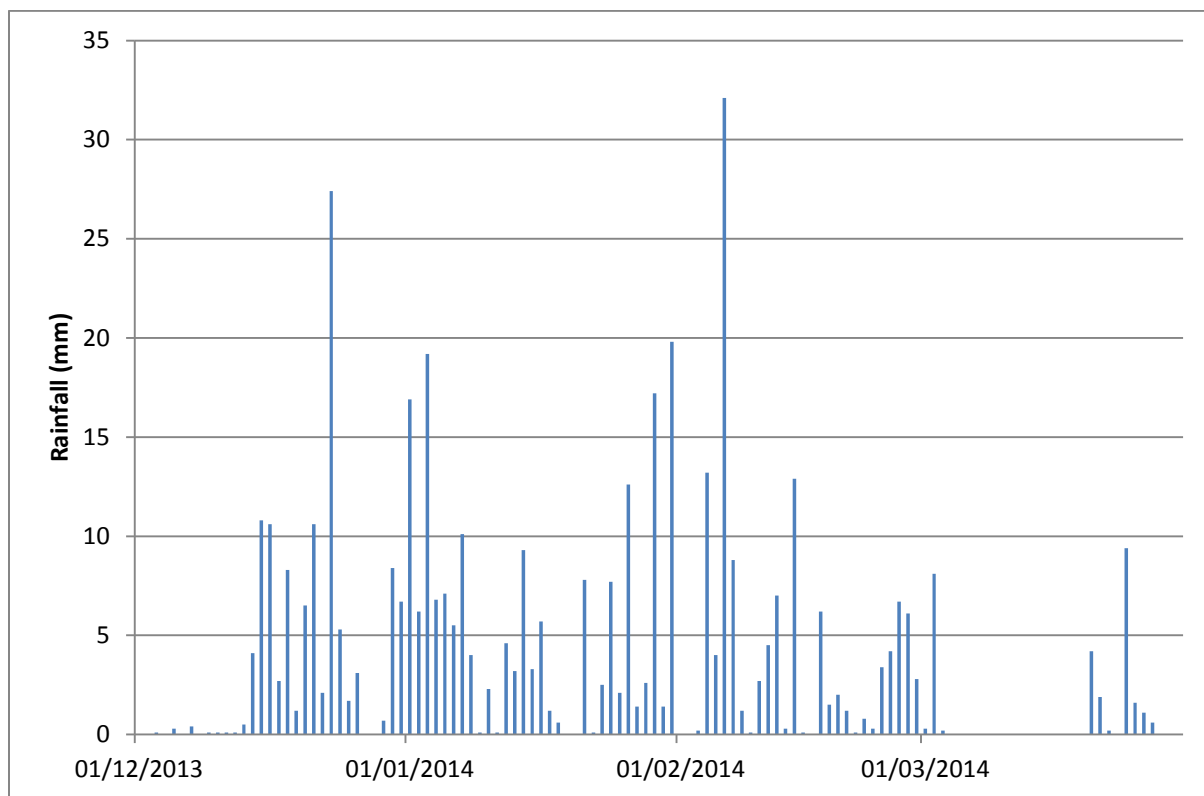
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3. Analysis of March and April 2014 flood event

3.1 Conditions at the time

The period between December 2013 and April 2014 received long periods of above average rainfall especially during January and February, as shown in figure 7. The above average rainfall lead to groundwater recharge within the chalk aquifer. The result of the rainfall and groundwater levels was groundwater flooding and fluvial flooding of the river Misbourne. As the river Misbourne is a chalk stream it derives the majority of its flow from the chalk aquifer therefore when groundwater levels are high so are stream flows.

Figure 7: Daily rainfall totals as recorded by the Environment Agency rain gauge at Little Chalfont (Environment Agency, 2014)



The EA's nearest telemetered river level gauge is at Little Missenden (SU 9342198458, approximately 11 km upstream of the centre of Chalfont St Peter). Figure 8 shows the river levels for December 2013 to April 2014.

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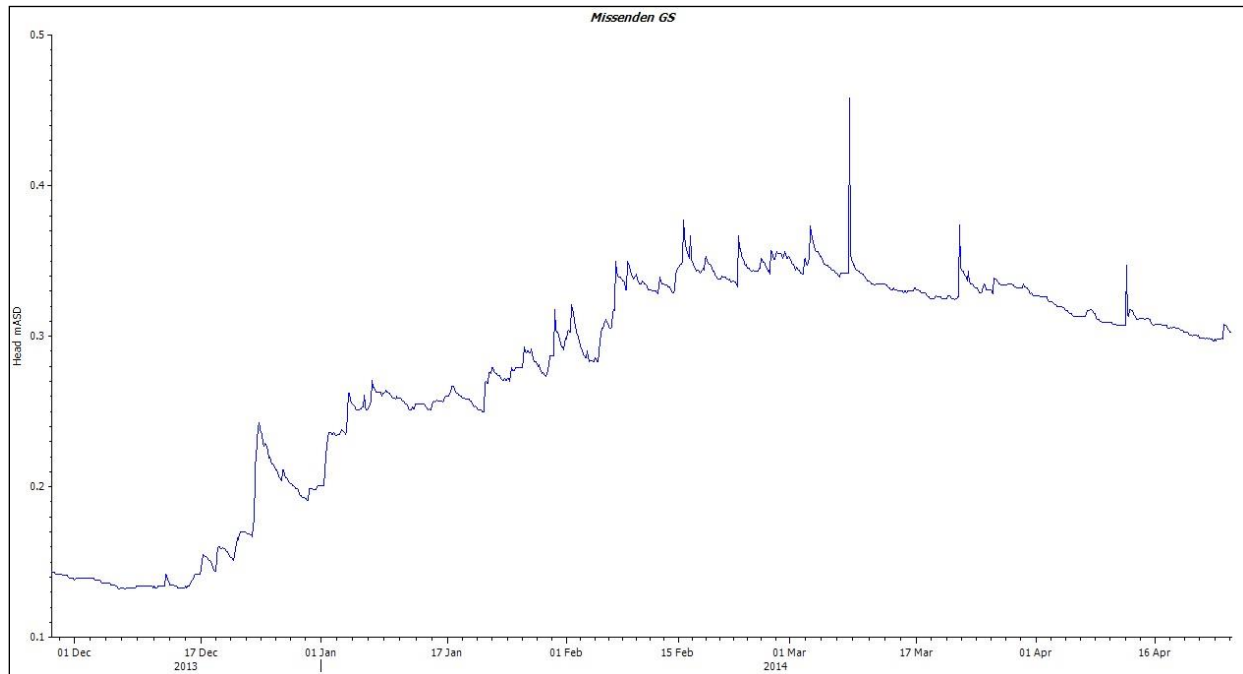


Figure 8: River Misbourne hydrograph, as per Little Missenden gauge measurements, December 2013 to April 2014 (Environment Agency, 2014)

The Little Missenden gauge has been in operation since October 1993. The EA's records for the gauge show that the entire event (the three months leading up to March 2014) is listed as number 1 of the top 10 levels ever recorded at this site. The peak level of the event was on 08 March 2014, at 459mm, although there were other peaks in river levels during the event in question, for example on 07 and 08 February 2014.

The measurements from the Little Missenden gauge give an early warning of high flows upstream of Chalfont St Giles. Due to the distance upstream this gauge will only give a relative river levels in Chalfont St Giles. However, Figure 9 – the hydrograph for the past three years – can give an indication of levels in the area. It shows the high levels of February/March 2014, with similar levels recorded in March/April 2013. As a note, river levels in the area vary in the period analysed by 443mm (the difference between the lowest and the highest recorded levels).

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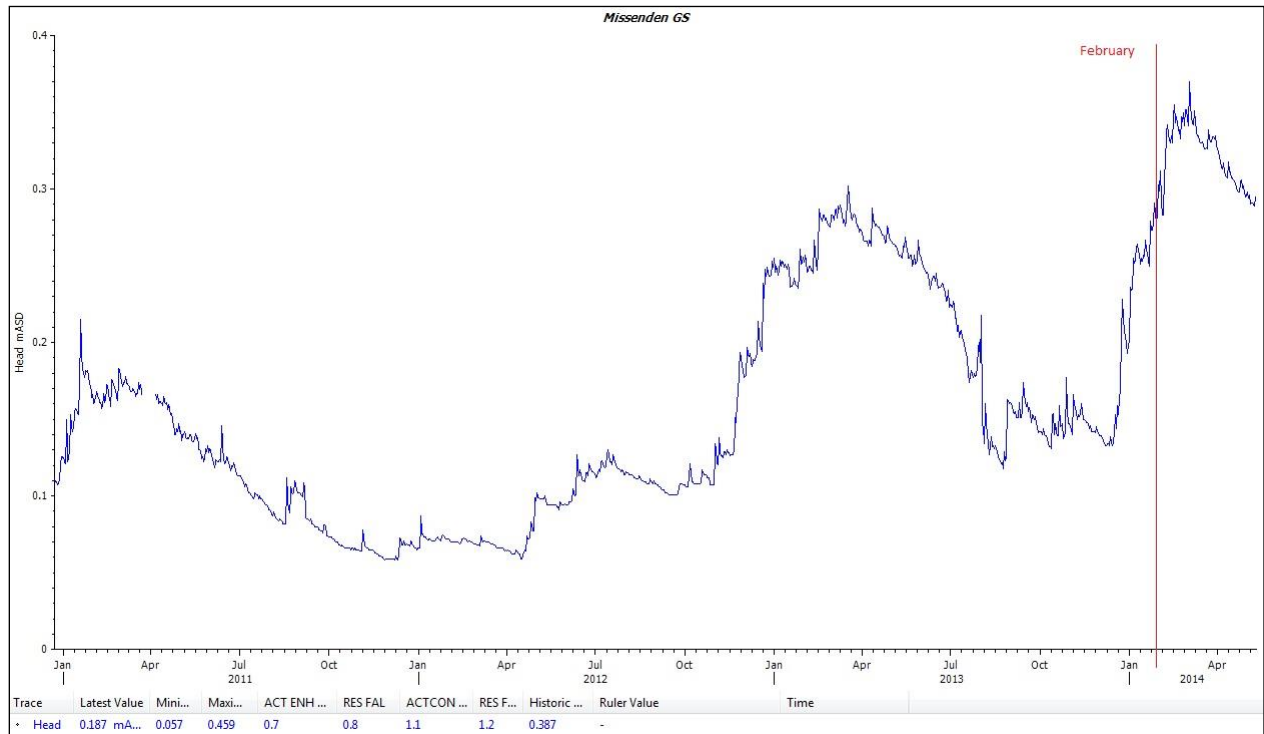


Figure 9: River Misbourne hydrograph, as per Little Missenden gauge measurements, January 2011 to April 2014 (Environment Agency, 2014)

Groundwater was 'exceptionally high' throughout the Colne catchment during the period of flooding under investigation; 'exceptionally high' is the maximum category for groundwater levels, meaning levels are likely to fall within this band 5% of the time (EA, February 2014). The EA, using the river gauge data at Little Missenden, treated the three-month period leading up to 08 March 2014 as one event, because of the heavy influence of groundwater. The situation was much the same across the whole River Colne catchment, with the soil moisture deficit (SMD) being zero in February 2014, indicating that the soil was completely saturated (EA, February 2014). This would have had important implications for the flooding, as the soil would have been unable to absorb the continuing rainfall.

3.2 Condition of features

There were no reports of any issues, damage or failings of the features within the highway drainage or surface water drainage system within the Chalfont St Giles locality and so this is unlikely to have impacted on this flood event.

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3.3 Condition of watercourse

The river Misbourne, as already detailed, was at bank full and in spate with some minor flooding of bankside gardens and farm land occurring. There were not however reports of any blockages within the watercourse that might have had an impact on the magnitude of the flooding that occurred during this event.

3.4 What happened?

The high water level within the chalk aquifer lead to the flooding of the Affinity Water public water supply pumping station and the BT telephone exchange both in Chalfont St Giles. The over pumping of the water from the BT telephone exchange in turn lead to disruption for the village as it flooded the high street and the carpark had to be closed also the main street in the village need to be reduced to one direction of traffic which had an economic impact on the small business within the village.

3.5 Possible causes

The primary cause of the flooding in Chalfont St Giles during the spring of 2014 was the exceptionally high groundwater level within the chalk aquifer.

3.6 Incident response

On 11 February 2014, the Affinity Water drinking water pumping station upstream of Chalfont St Giles ceased pumping due to groundwater flooding, as detailed by Affinity Water.

The high groundwater levels caused flooding of the British Telecommunications (BT) Telephone Exchange in Chalfont St Giles this meant that BT needed to pump the excess groundwater out of their basement.

The incident response was coordinated in partnership with all the stakeholders by Chiltern District Council. They arrange meetings to facilitate partnership working in an effective and coordinated manner. This coordinated response involved the following stakeholders;

- Chiltern District Council
- British Telecom
- Environment Agency
- Transport for Buckinghamshire
- Buckinghamshire County Council
- Chalfont St Giles Parish Council

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The coordinated response was focused around the pumping of groundwater out of the BT telephone exchange. The response included the following;

- Pumps were provided and manned by TfB
- Change to the road layout and ramp and pipes across the road were provided by TfB
- The public carpark was closed by Chiltern District Council
- The EA monitored the river condition and the
- The Parish council kept the local businesses and residents informed and kept the group up to date with issues within the village
- A local farmer provided hay bales for use along the edge of the road to stop pedestrians being sprayed with water by passing cars

4. Responsible Authorities and landowners

There are different responsibilities for flood management depending on the type of flooding. Organisations responsible for flooding are known as Risk Management Authorities (RMAs) and their responsibilities are detailed below. Riparian landowners also have responsibilities for watercourses across their land and these are also detailed below. These are summaries of the details included in the Buckinghamshire County Councils Local Flood Risk Management Strategy (2013-2018).

4.1 Lead Local Flood Authority

The Lead Local Flood Authority in this area is Buckinghamshire County Council. Buckinghamshire County Council has a role as a RMA in coordinating management of local flood risk from surface water, ground water and ordinary watercourses in the county.

4.2 Chiltern District Council

Chiltern District Council have responsibilities to inspect and maintain watercourses on District Council land, respond to requests for assistance during flood events and have the power, if instructed by Buckinghamshire County Council, to carry out flood risk management work which will benefit management of surface runoff, groundwater and ordinary water courses.

4.3 Environment Agency

The Environment Agency is one of the RMAs as defined by the Flood and Water Management Act 2010. Protecting the river environment and managing flood risk is part of their job. The EA is the RMA for flooding from main rivers.

4.4 Highways Authority – Transport for Buckinghamshire

Any flooding from highways is managed by the Highways Authority which is BCC and the highways function is managed by TfB.

4.5 Water Utility Company – Thames Water

Thames Water is responsible for flooding from foul sewers and surface water sewers which they own. Whilst undertaking this they must manage flood risk from sewers

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4.6 Landowners and riparian owners

Landowners and riparian owners must maintain any culvert, or the bed and banks of any adjacent watercourse. They should clear away any debris from the watercourse or culvert even if it did not originate from their land.

Riparian owners can find further guidance on their responsibilities as landowners in the Environment Agency document 'Living on the Edge' which can be found online at https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/297423/LI_T_7114_c70612.pdf.

4.7 Residents

Residents have a responsibility to take measures to protect themselves and their property when flooding is imminent.

4.8 Emergency Responsibilities

The emergency responsibilities are outlined in table 1 below. Please note that Parish and Town Councils do not have a legal obligation to respond to emergencies. Whatever service they provide is voluntary and unique to each Parish or Town Council.

Table 1 Roles and responsibilities in an emergency, during and after a flood event

<p>Local (County and District) Authorities</p> <ul style="list-style-type: none"> • Coordinate emergency support within their own functions • Deal with emergencies on 'non main rivers' • Coordinate emergency support from the voluntary sector • Liaise with central and regional government departments • Liaise with essential service providers • Open rest centres • Manage the local transport and traffic networks • Mobilise trained emergency social workers • Provide emergency assistance • Deal with environmental health issues, such as contamination and pollution • Coordinate the recovery process • Manage public health issues • Provide advice and management of public health • Provide support and advice to individuals • Assist with business continuity 	
<p>Police Force</p> <ul style="list-style-type: none"> • Save life • Coordination and communication between emergency services and organisations providing support • Coordinate the preparation and dissemination <p>Fire and Rescue Service</p> <ul style="list-style-type: none"> • Save life rescuing people and animals • Carry out other specialist work, including flood rescue services • Where appropriate, assist people where the use of fire service personnel and equipment is relevant <p>Ambulance Service</p> <ul style="list-style-type: none"> • Save life • Provide treatment, stabilisation and care at the scene 	<p>Utility Providers</p> <ul style="list-style-type: none"> • Attend emergencies relating to their services putting life at risk • Assess and manage risk of service failure • Assist with recovery process, that is, water utilities manage public health considerations <p>Internal Drainage Board</p> <ul style="list-style-type: none"> • Operate strategic assets to reduce flood risk in partnership with RMAs and public <p>Town and Parish Councils</p> <ul style="list-style-type: none"> • Support emergency responders • Increase community resilience through support of community emergency plan development <p>Voluntary services</p> <ul style="list-style-type: none"> • Support rest centres • Provide practical and emotional support to those affected • Support transport and communications • Provide administration • Provide telephone helpline support
<p>Environment Agency</p> <ul style="list-style-type: none"> • Issue Flood Warnings and ensure systems display current flooding information • Provide information to the public on what they can do before, during and after a flood event • Monitor river levels and flows • Work with professional Partners and stakeholders and respond to requests for flooding information and updates • Receive and record details of flooding and related information • Operate water level control structures within its jurisdiction and in line with permissive powers • Flood event data collection • Arrange and take part in flood event exercises • Respond to pollution incidents and advise on disposal • Assist with the recovery process, for example, by advising on the disposal of silt, attending flood surgenes 	

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5. Conclusions and recommendations

5.1 Conclusions

The flooding in Chalfont St Giles during the spring of 2014 was caused by exceptionally high groundwater levels within the chalk aquifer. The groundwater flooding affected the local critical infrastructure; both the Affinity Water pumping station and the BT telephone exchange were impacted by the flooding along with the main access road to the shops in the centre of the village. The reason for the flood event was entirely nature and therefore the recommendations will only reduce the impact of any future flood events rather than remove the possibility of a flood of this nature happening again.

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5.2 Recommendations

Authority/Stakeholder	Recommended Action
Bucks CC	<ul style="list-style-type: none"> ensure that owners of culverts, watercourses and drainage infrastructure are aware of their responsibilities. facilitate sharing of information between RMAs and the community and to investigate establishing a residents' flood group. keep in mind enforcement action under Section 25 of the LDA where landowners have failed to maintain watercourses. Look at possibility for temporary defences along the Misbourne which may help to protect Chalfont St Giles
EA	<ul style="list-style-type: none"> distribute living on the edge leaflets to residents and land owners who own a section of the river bank. investigate if flood warnings can be issued in this area. complete River Misbourne investigation which will incorporate the Chalfont St Giles flooding issues.
TfB	<ul style="list-style-type: none"> continue to clear and maintain the surface water drains and gullies in Chalfont St Giles as part of their ongoing maintenance schedule.
BT	<ul style="list-style-type: none"> improve resilience of Chalfont St Giles Telephone Exchange against groundwater flooding. Write procedure for pumping excess groundwater from this facility during flood events in partnership with all risk management authorities.
Affinity Water	<ul style="list-style-type: none"> improve the resilience of Chalfont St Giles Pumping Station against groundwater flooding.
Residents and landowners	<ul style="list-style-type: none"> ensure that the River Misbourne banks are maintained in a suitable manner.
Residents	<ul style="list-style-type: none"> document and photograph flood incidents where possible and report flooding to CDC and/or Bucks CC and EA.
EA, residents and Parish Council	<ul style="list-style-type: none"> work together to maintain the river
All Risk Management Authorities	<ul style="list-style-type: none"> make improvements to the emergency response and co-ordination from all organisations. should fully understand the Thames Valley Local Resilience Forum Flood Plan and how Operational or Tactical Command Posts can aid the emergency response of all RMAs during an event. explore the possibility of setting up a groundwater flooding warning system. Investigate options for flood management as part of the River Misbourne catchment

Explanation of Acronyms

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Acronym	Definition
Bucks CC	Buckinghamshire County Council
BCC	Buckinghamshire County Council
AVDC	Aylesbury Vale District Council
EA	Environment Agency
TfB	Transport for Buckinghamshire
LLFA	Lead Local Flood Authority
RMA	Risk Management Authority
FWMA	Flood and Water Management Act 2010
IDB	Internal Drainage Board
BFRS	Buckinghamshire Fire and Rescue Service
NGR	National Grid Reference
BGS	British Geological Survey
STW	Sewage Treatment Works

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References

Reference in document	Refers to:
BGS, 2014	British Geological Survey Geology Map of the UK
EA, 2013	uFFMS http://www.ufmfsw.com
PFRA, 2011	Buckinghamshire County Preliminary Flood Risk Assessment, May 2011

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Contacts

Lead Local Flood Authority



Flood Management Team
Buckinghamshire County Council
County Hall
Walton Street
Aylesbury
Bucks HP20 1UY

Telephone: 084537 08090

Email: FloodManagement@buckscc.gov.uk

Website: www.buckscc.gov.uk/flooding

Environment Agency



**Environment
Agency**

National Customer Contact Centre
PO Box 544
Rotherham
S60 1BY

Telephone: 03708 506506

Email: enquiries@environment-agency.gov.uk

Website: <http://www.gov.uk/government/organisations/environment-agency>

District Council



Aylesbury Vale District Council
The Gateway
Gatehouse Road
Aylesbury
Bucks HP19 8FF

Opening times

Monday - Thursday

8.45am – 5.15pm

Friday

8.45am – 4.45pm*

Telephone: 01296 585858

*Customer service centre closes
at 4pm on Friday

Highways Authority

Transport for Buckinghamshire



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Telephone: Transport and roads – 0845 2302882
Out of hours emergencies (Highways) – 01296 486630

Email: fb@buckscc.gov.uk

Website: <http://www.transportforbucks.net/Transport-and-roads.aspx>

Water Utility



Thames Water
PO Box 286
Swindon
SN38 2RA

Telephone: 0845 9200 800

Website: <http://www.thameswater.co.uk/help-and-advice/16739.htm>

Emergency Response

Buckinghamshire Fire and Rescue Service

Address: Buckinghamshire Fire & Rescue Service, Brigade HQ, Stocklake, Aylesbury, Bucks, HP20 1BD

Telephone: 01296 744400

Website: <http://www.bucksfire.gov.uk/BucksFire/Contact+Us/>

Thames Valley Police

Telephone: 101 in non-emergency, 999 in emergency

Website: <http://www.thamesvalley.police.uk/contactus-phone.htm>

Buckinghamshire Ambulance Service

Telephone: 111 in non-emergency, 999 in emergency

Website: <http://www.southcentralambulance.nhs.uk/content/press-release/buckinghamshire/flooding-advice.ashx>

Appendices

Appendix A: BCC criteria for a Section 19 Investigation

- Internal flooding (including to basements) to five or more residential properties within an area of 1km²
- Internal flooding of two or more business premises within an area of 1km²
- Internal flooding (including to basement) of at least one property for one week or longer
- Flooding of one or more items of critical infrastructure, which could include hospitals, health centres, clinics, surgeries, colleges, schools, day nurseries, nursing homes, emergency services (police, fire, ambulance) stations, utilities and substations.
- Caused a transport link to be impassable for the following periods:
 - Motorways, trunk roads and major rail links – 2 hours or more
 - Class A and B highways and other railway links – 4 hours or more
 - Class C highways – 10 hours or more unless the route is the only means of access, or is primary route for critical infrastructure then reduce to 4 hours
 - Class U highways – 24 hours or more unless the route is the only means of access, or is primary route for critical infrastructure then reduce to 4 hours
- Any flooding event that a risk management authority deems significant does not meet the agreed thresholds should be brought to the next strategic flood management committee for consideration.

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