

05/05/15

Buckinghamshire County Council

Flood Investigation Report

Wooburn Green

February 2014



05/05/15

Revision Schedule

Buckinghamshire County council
Flood Investigation Report

Rev	Date	Details	Author	Checked and Approved by
1	29/12/2014	Version 1 - draft	Karen Fisher	
2	28/01/2015	Final	Karen Fisher	

05/05/15

Table of Contents

Executive Summary	4
1. Introduction	4
1.1 Background to investigation	4
1.2 Site Location.....	5
1.3 River network and drainage system	7
2. Background/ History of flooding	9
2.1 Catchment and site characteristics.....	9
2.2 Previous flood events	112
2.3 Rainfall Data.....	123
2.4 Flood Patterns and influences on flood risk	14
3. Analysis of January and February 2014 flood events	15
3.1 Conditions at the time (i.e. ground conditions).....	15
3.2 Condition of features/ structures.....	15
3.3 Condition of watercourse.....	15
3.4 What happened in 2014 flood events? (Flows paths, damage etc.).....	15
3.5 Diary and Incident response.....	156
3.6 Possible causes	177
4. Responsible Authorities and landowners	17
4.1 Lead Local Flood Authority.....	17
4.2 Wycombe District Council.....	178
4.3 Environment Agency	188
4.4 Highways Authority – Transport for Buckinghamshire	18
4.5 Water Utility Company – Thames Water.....	18
4.6 Canal and Rivers Trust.....	18
4.7 Landowners and riparian owners.....	18
4.8 Residents	18
4.9 Emergency Responsibilities	199
5. Conclusions and recommendations	211
5.1 Conclusions.....	211
5.2 Recommendations	211
Explanation of Terms and Acronyms	233
References	233
Contacts	244

05/05/15

Executive Summary

This report has been produced by Buckinghamshire County Council (BCC) to investigate the flooding that occurred at Windsor Hill, Wooburn Green between 6th and 12th February 2014. The report provides details of the event and makes recommendations for Risk Management Authorities (RMAs) to undertake to reduce future flood risk.

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 RMAs 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 these flood events in January and February 2014 exceeded BCCs 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 the management of flood risk in the future.

The flood event in February 2014 occurred after a prolonged period of above average rainfall which caused the surrounding land to become saturated. The Windsor Hill road was closed for 5 to 6 days and a couple of house had water up to their floorboards and the cellar of the public house was flooded.

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

05/05/15

(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 Local Flood Risk Management Strategy, BCC 2013.

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

- Class A and B highways and other railway links – closed for 4 hours or more
Windsor Hill was closed from 6th February to 12th February.

1.2 Site Location

Wooburn is located in the Wycombe district of the County of Buckinghamshire.

Figure 1a shows the location of Wooburn Green in the south of the county.

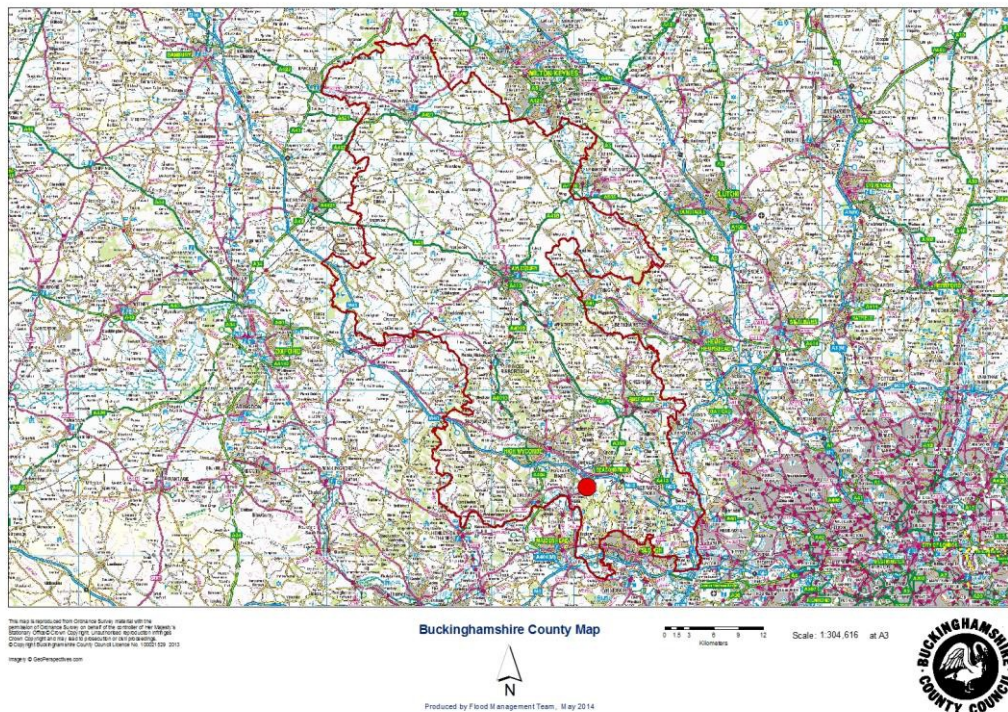


Figure 1a Location map of Wooburn Green at County level (Ordnance Survey License 100021529 2014)

05/05/15

Figure 1b shows the local map around the region of Wooburn Green which was flooded.



Buckinghamshire County Map
Produced by Flood Management Team, September 2014
This map is reproduced from Ordnance Survey material with the
permission of Ordnance Survey on behalf of the controller of Her Majesty's
Stationary Office © Crown Copyright. Unauthorised reproduction infringes
Crown Copyright and may lead to prosecution or civil proceedings.
© Copyright Buckinghamshire County Council Licence No. 100021529 2013
Imagery © GeoPerspectives.com

Figure 1b Location map of Wooburn Green at local level (Ordnance Survey License 100021529 2014)

05/05/15

1.3 River network and drainage system

The River Wye is the main river through Wooburn Green. The river comes from High Wycombe upstream and flows into the River Thames downstream at Bourne End. The river is perched above the floodplain between the B4440 and Windsor Hill and does not flow along the base of the valley. Once the river flows under the road at Windsor Hill the channel splits and part of it flows west towards the main road A4094 and then follows the main road. The other channel flows SW around the east boundary and then turns through a right angle and follows the southern boundary of Wooburn Manor Park residential area. The two channels come together again at the SW corner of Wooburn Manor Park before following a route SW along the A4094 through Wooburn. The river channels around this area are all main river and fall under the responsibility of the Environment Agency.

Photos below show the upstream and downstream views of the channel from the road.



Figure 2 shows the other drainage assets around the area of Windsor Hill, Wooburn Green including the highway drainage, gullies and soakaways, the Thames Water clean water supply pressure main and the Thames Water foul gravity sewer. This indicates that there is a small highways drainage system at the bottom of Windsor Hill with two gullies, an inspection chamber and a soakway outside the property Salan. There are also two gullies further up Windsor Hill and these gullies and highways drainage system is there to deal with the road runoff from Windsor Hill.

05/05/15

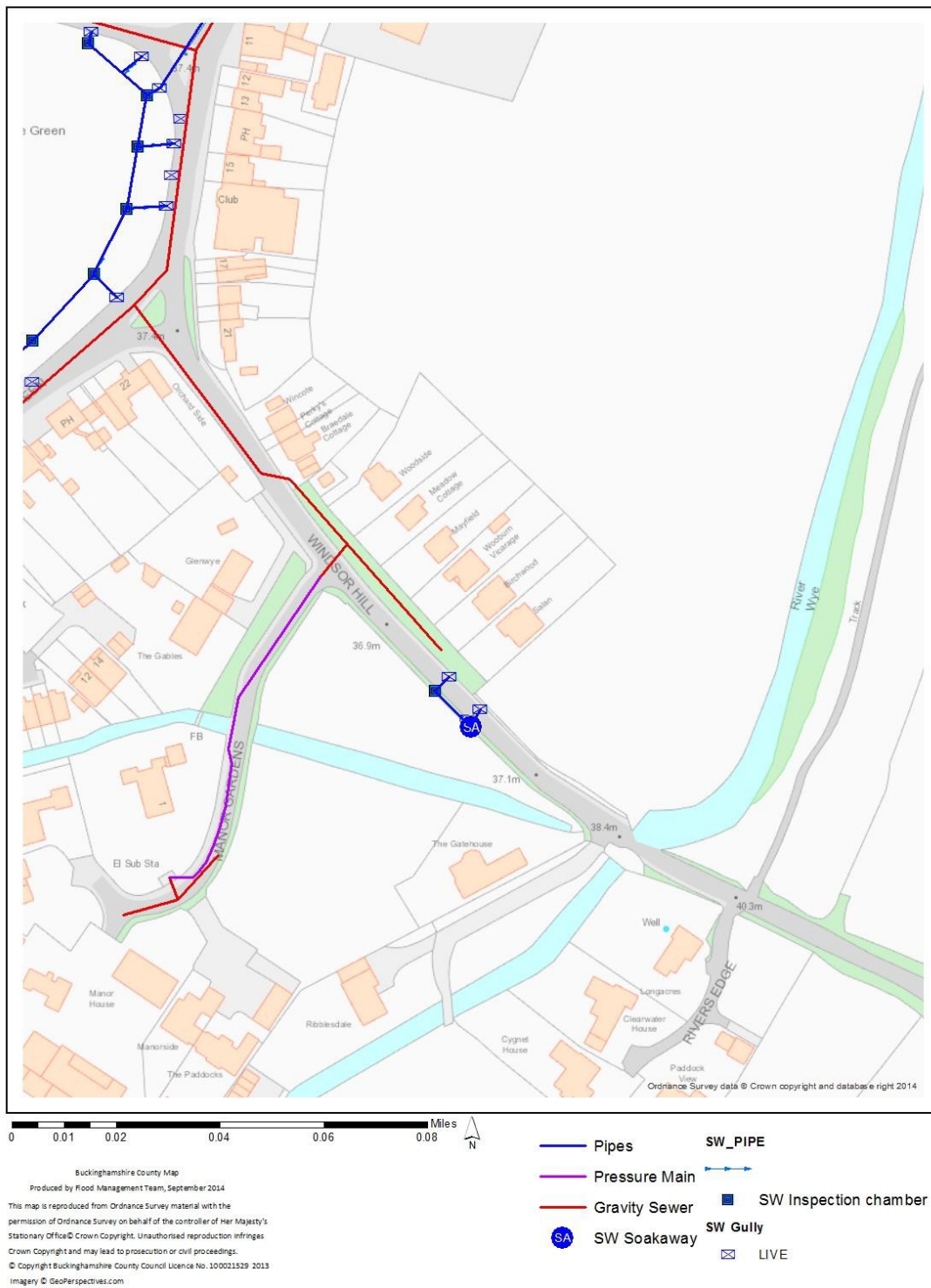


Figure 2 Network of assets

05/05/15

2. Background/ History of flooding

2.1 Catchment and site characteristics

Figure 3 shows the fluvial flood zone. This shows that there are 9 properties on the north side of Windsor Hill which are at risk from a 1 in 100 year flood (Zone 3) and more at risk from a 1 in 1000 year flood (Zone 2). On the south side of Windsor Hill there are further properties at risk from fluvial flooding from the River Wye along Manor Gardens.

The predicted surface water flooding for a 1 in 100 year event is shown in Figure 4. This shows that although the road is at risk the water would only reach the properties along Windsor Hill in a very extreme 1 in 100 year flood although water would pond around the houses in less extreme events of 1 in 30 year and 1 in 100 year surface water events.

05/05/15

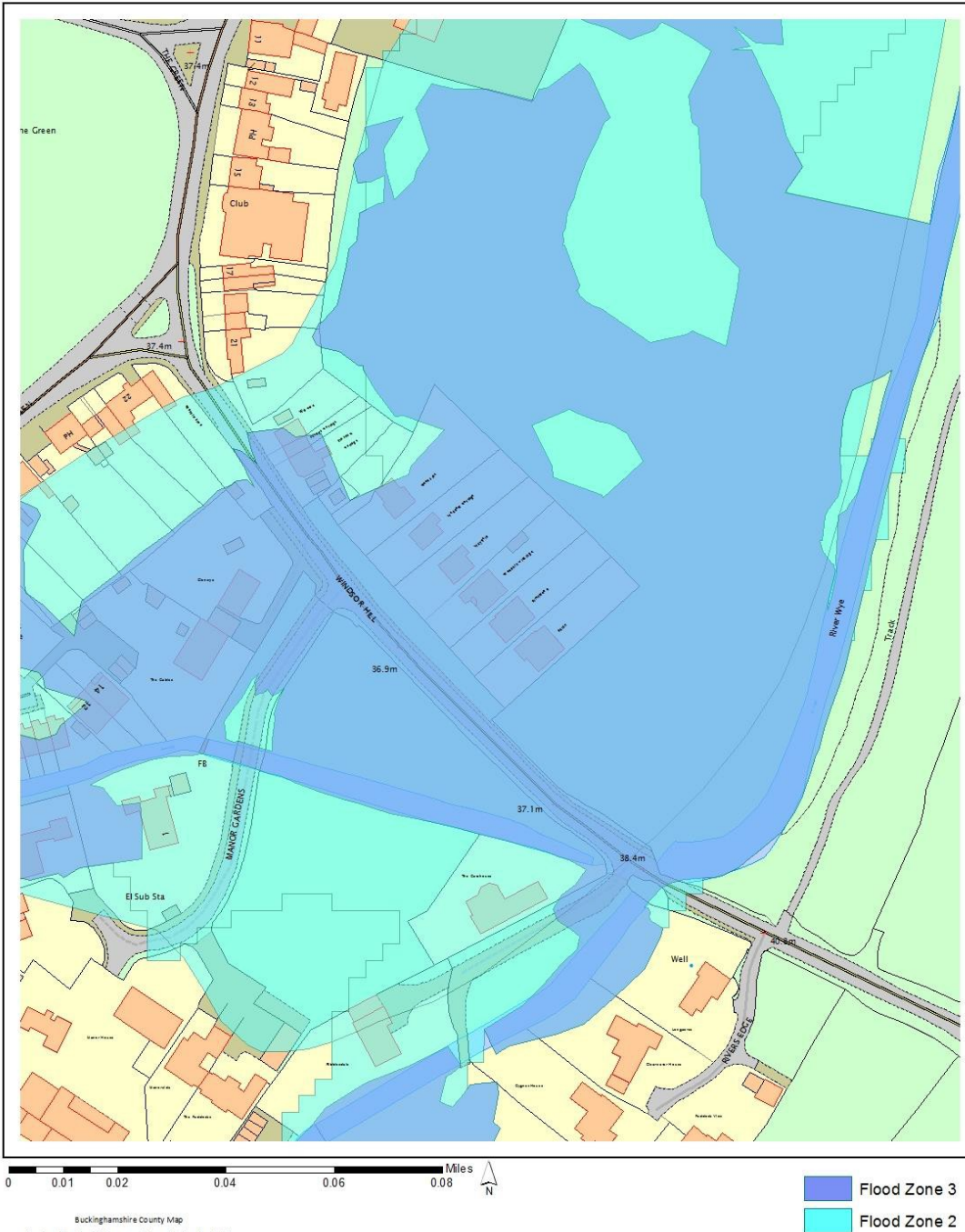


Figure 3 Areas at risk from river flooding, EA 2014

05/05/15

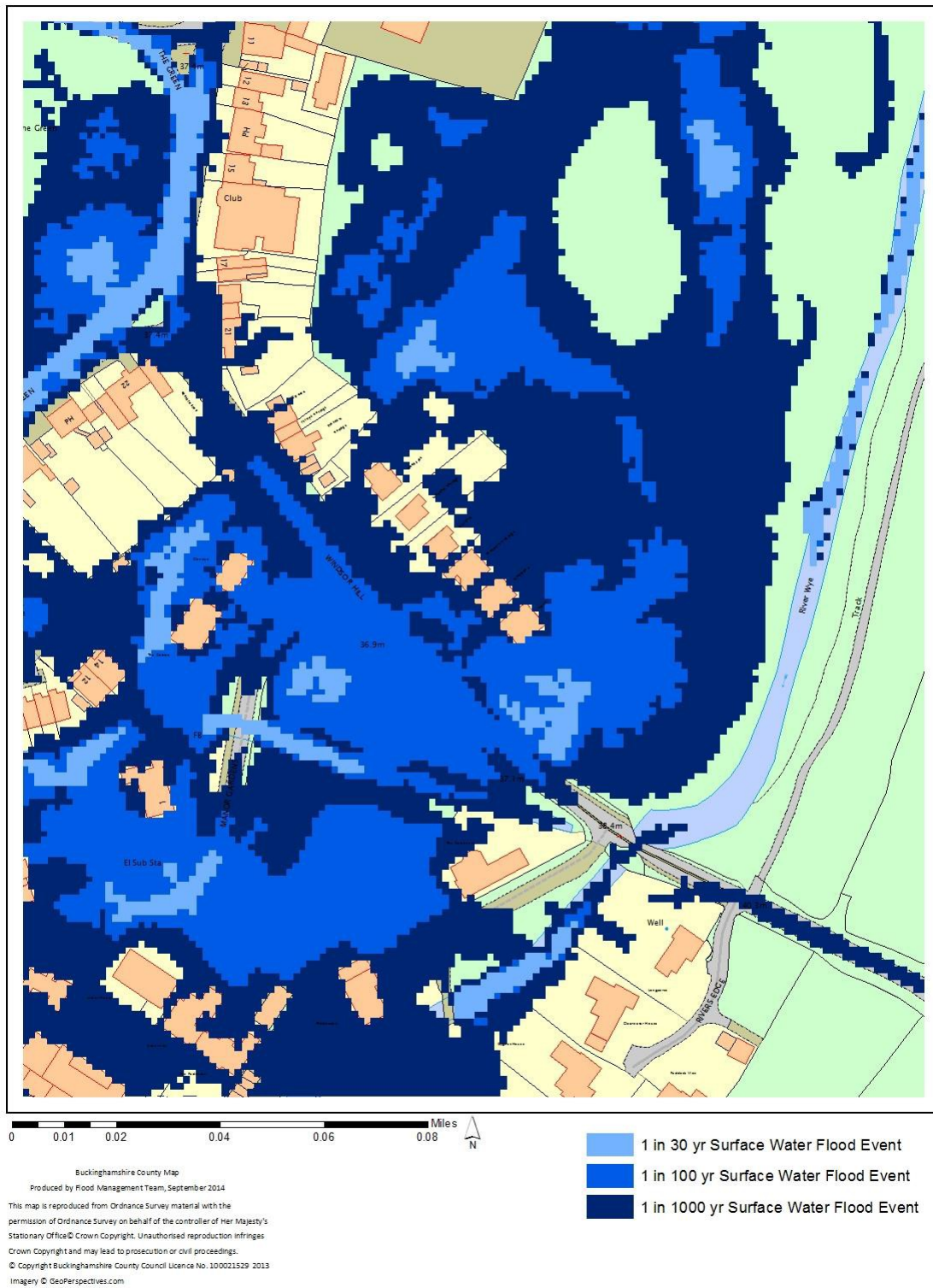


Figure 4 Areas at risk from Surface water flooding, EA, 2014

05/05/15

2.2 Previous flood events

In the Preliminary Flood Risk Assessment (PFRA, 2011) the records show that there are some risk of groundwater flooding in this area.

From records from residents there has been flooding on previous occasions from 2001 and 2003. Photos below show that the nature of the flooding is consistent with the maps in Figures 3 and 4 with flooding on the Windsor Hill road and then in the fields between the river and the property Salan. These fields are lower than the river and therefore it is the route of flooding when the river bursts its banks. Photos below show this historic flooding.



05/05/15

2.3 Rainfall Data

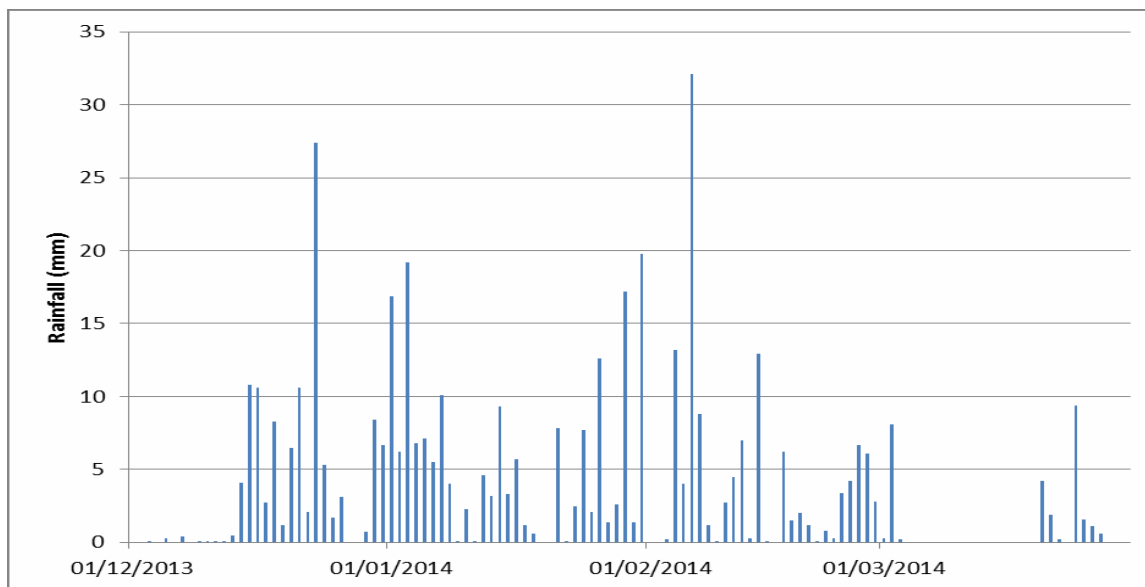
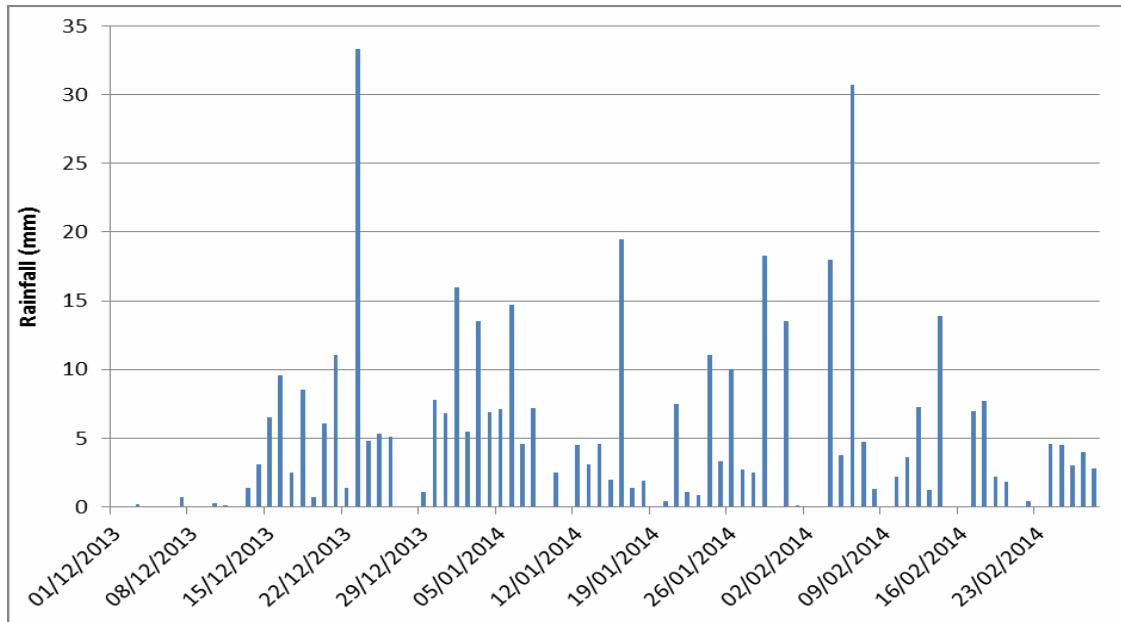


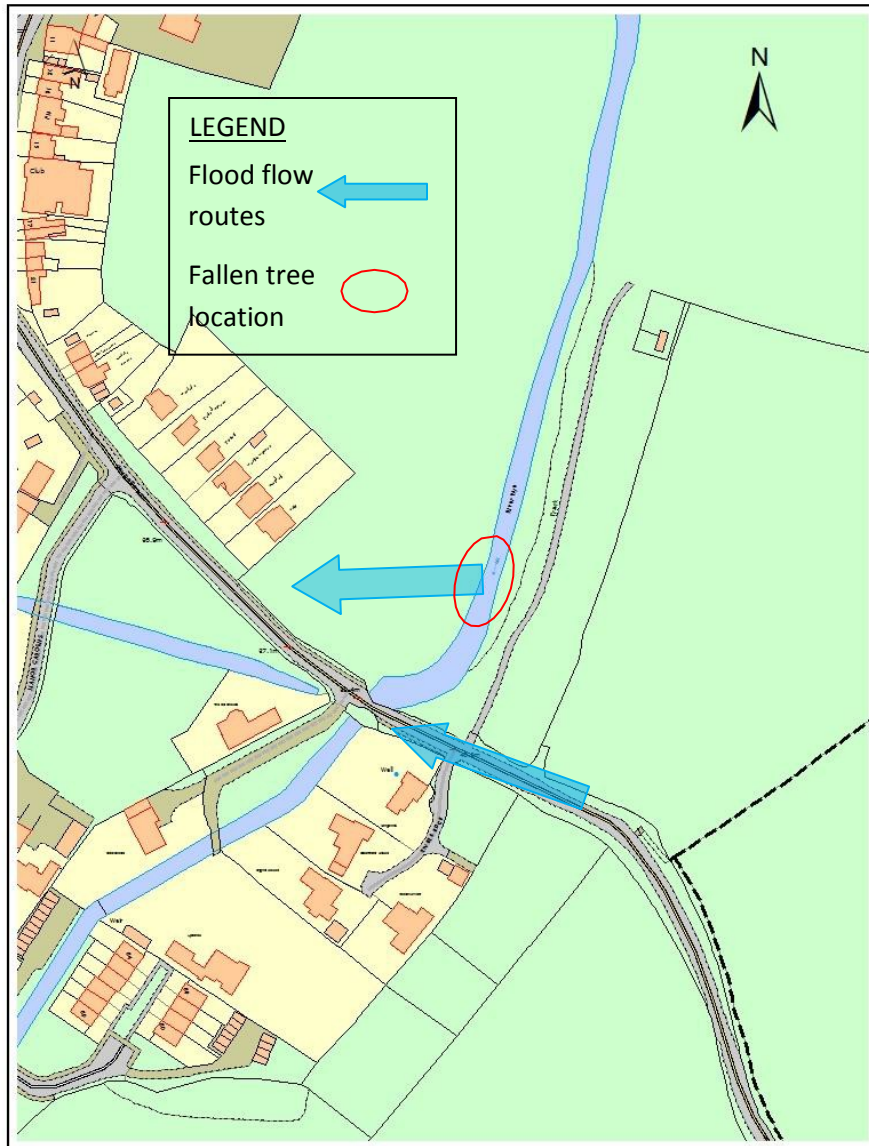
Figure 5 Rainfall data from Hambleton and Little Chalfont

Figure 5 shows the rainfall data from the Hambleton and Little Chalfont rain gauges which are the closest gauges to Wooburn Green. These records show rainfall nearby for the three month period December 2013, January and February 2014. This figure shows the consistently high rainfall over this period with rain on the majority of days and 6 days when the rainfall totals were over 15mm. The winter rainfall recorded in Buckinghamshire in December 2013, January and February 2014 was 420mm in comparison to 185mm average winter rainfall.

05/05/15

2.4 Flood Patterns and influences on flood risk

The flow routes for flooding are shown in the figure 6 below. The flood water is likely to come from two directions. The first is from the River Wye when it bursts its banks and flows across from the right bank across the fields and towards the houses on Windsor Hill. The second route is down Windsor Hill which is steep.



This map is reproduced from Ordnance Survey material with the permission of Ordnance Survey on behalf of the controller of Her Majesty's Stationery Office © Crown Copyright. Unauthorised reproduction infringes Crown Copyright and may lead to prosecution or civil proceedings. © Copyright Buckinghamshire County Council Licence No. 100021529 2013
 Image by © GeoPepe2@aol.com

Buckinghamshire County Map
 Produced by Flood Management Team, September 2014

Figure 6 Flood flow routes

3. Analysis of January and February 2014 flood events

3.1 Conditions at the time (i.e. ground conditions)

The extensive rainfall and wet conditions over the 3 months leading up to the flooding events of 6th February meant that the surrounding ground was saturated and the soil moisture deficit across the catchment was 0mm. the groundwater levels in the region were also very high.

3.2 Condition of features/ structures

There are a number of structures and flood defences along the River Thames in this area which are regularly inspected and their condition was rated as good.

3.3 Condition of watercourse

There was a large tree which had fallen into the river upstream of the bridge on Windsor Hill during the summer of 2013. The approximate location of this tree is shown in Figure 6. The tree was not removed by the owner of the land or the tenant on the land or by the Environment Agency despite repeated requests by the residents of the properties on Windsor Hill for this action to be taken. The field is used for grazing of horses and the horse owners offered to remove the tree but this request was refused by the tenant/owners of the land. The tree was blocking an unimpeded flow path.

3.4 What happened in 2014 flood event? (Flows paths, damage etc.)

During the period of Winter 2013/14 the very high levels of rainfall had caused the levels in the River Wye to be high. Figure 7 below shows the river gauge levels from the gauge upstream at Loudwater for the early February 2014 period. This shows that the levels were at a peak on 7th February 2014.

In addition to the river levels being high there was a tree was blocking the channel upstream of the Windsor Hill bridge (as explained in 3.3 above). As the flow was unable to pass freely down the channel the river broke its banks upstream of the tree blockage on the right bank and flowed down into the field and towards Windsor Hill and the properties to the north side of the road. The field between the river and the houses was filled with water up to waist deep and the horses had to be removed from the field for their safety. Residents were able to remove their cars to a safe location and water had to be pumped out from the front gardens. Water was coming towards the houses from the road and from the rear. Once the flooding had become very deep in the field the tree was removed and the water receded. The properties had water up to their floor

05/05/15

boards and in their gardens and drive and the Queen and Albert public house had their cellar flooded.

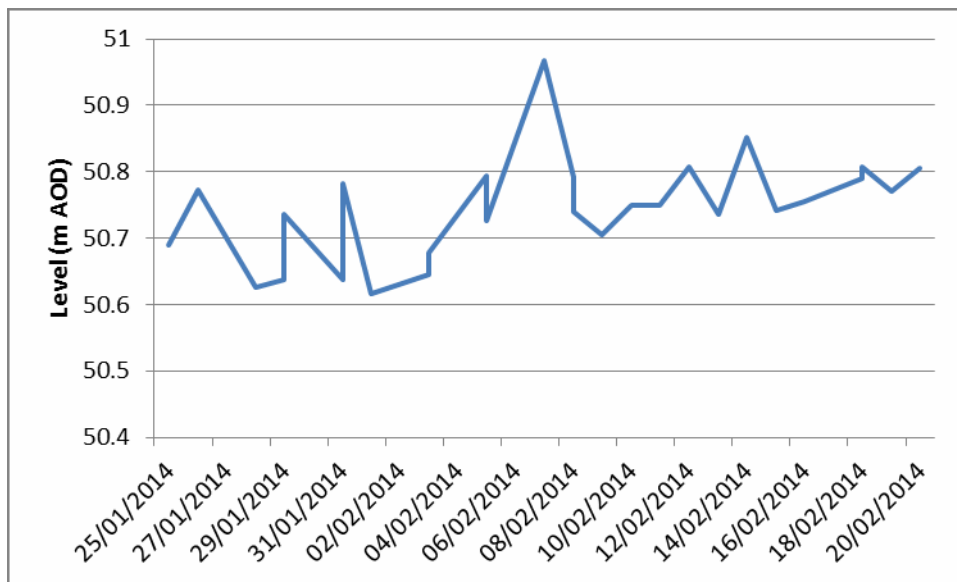


Figure 7 Levels at the Loudwater gauge January and February 2014

3.5 Diary and Incident response

February 2014

Date and time	Activity/event	Agency
06 February 2014	Flood alert issued for the River Wye at 20.30	EA
07 February 2014	Windsor Hill, Wooburn Green – road closed	TfB/BCC
09 February 2014	Windsor Hill, Wooburn Green – road remains closed	TfB/BCC
11 February 2014	Windsor Hill, Wooburn Green – road remains closed	TfB/BCC
12 February 2014	Windsor Hill, Wooburn Green – road opened	TfB/BCC
29th February 2014	Flood alert removed for River Wye 09.04	EA

During the period of flooding residents called the Environment Agency to report the incident. As there were no properties flooding, the EA were unable to provide

05/05/15

immediate response as they were responding to other incidents across the Thames Valley.

The residents took measures to protect themselves and their property and asked for assistance from the EA and TfB/BCC who closed the road to prevent vehicles from passing through deep water and causing water to be pushed into the houses.

3.6 Possible causes

Prolonged rainfall caused the land to be saturated and therefore there was increased water from the catchment entering river network. The rainfall in this area created a fluvial event which was measured as between a 1 in 50 year and 1 in 100 year event.

The tree in the channel of the River Wye upstream of Windsor Hill bridge was blocking the free flow of water and during the high flows this caused the water to overtop the right bank and flow into the field, road and up to the house on the north side of Windsor Hill.

Residents are concerned about the impact of upstream developments on the flood risk in Wooburn Green. In this flood incident there is no evidence that upstream development had any impact. The concerns of residents can be made during the planning process for development to Wycombe District council.

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 BCC Local Flood Risk Management Strategy (2013-2018) (BCC, 2013).

4.1 Lead Local Flood Authority

The LLFA in this area is Buckinghamshire County Council. BCC have a role as a RMA in coordinating management of local flood risk from surface water, ground water and ordinary watercourses in the county. The River Wye is designated as a main river. Any flooding from surface water comes under BCC as the LLFA.

4.2 Wycombe District Council

Wycombe District Council (WDC) have responsibilities to inspect and maintain

05/05/15

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

4.3 Environment Agency

The EA is one of the RMAs as defined by the FWMA 2010. Protecting the river environment and managing flood risk is part of their job. The EA is the RMA for flooding from main rivers. The River Wye is designated as a main river. The EA have permissive powers and responsibilities to manage flood risk from main rivers. The EA is a statutory consultee in the planning process and provides advice to local authorities where development is proposed in the floodplain.

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

4.6 Canal and River Trust

Not relevant in this location

4.7 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 on the Government's 'Owning a watercourse' page which can be found online at <https://www.gov.uk/guidance/owning-a-watercourse>.

4.8 Residents

Residents have a responsibility to take measures to protect themselves and their

05/05/15

property when flooding is imminent.

4.9 Emergency Responsibilities

The emergency responsibilities are outlined in table 1 below.

05/05/15

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 surgeries 	

05/05/15

5. Conclusions and recommendations

5.1 Conclusions

The heavy and persistent rain across the Thames Valley during December 2013 and January/February 2014 had caused the land to be saturated and therefore there was increased water from the catchment entering river network.

The tree in the channel of the River Wye upstream of Windsor Hill bridge was blocking the free flow of water and during the high flows this caused the water to overtop the right bank and flow into the field, road and up to the house on the north side of Windsor Hill. Once the tree was removed the water levels receded.

The Windsor Hill road was closed by TfB/BCC between 6th and 12th February 2014 to prevent cars from driving through deep flood water and to prevent wash from cars into the properties at risk.

The residents pumped to prevent flood water entering their properties and water surrounded the properties on the north side of Windsor Hill. Water came up to the floor boards in a number of properties.

5.2 Recommendations

Some recommendations have been put forward and are summarised in the table below. They include some actions such as maintenance of the defences and structures and these actions have to be part of an ongoing schedule. The table also includes some more strategic actions, such as looking at where defences need to be upgraded to take account of climate change or areas upstream where flood water can be attenuated or stored.

When discussing the possible causes it was clear that several actions could be undertaken by a variety of the RMAs involved to help to alleviate and manage the flooding issue.

Authority/Stakeholder	Recommended Action
EA	<ul style="list-style-type: none"> • Encourage residents to register for flood warning • To ensure the owners of culverts and watercourses/ditches within the area are aware of their responsibilities. • If required to use enforcement action under Section 107 (3) of the Water Resources Act 1991 where proper flow of water in a main river is impeded.

05/05/15

TfB	<ul style="list-style-type: none"> • Carry out cleansing of all gullies and highway drainage and continue to do so as part of the agreed maintenance schedule.
BCC	<ul style="list-style-type: none"> • To ensure the owners of culverts and watercourses/ditches within the area are aware of their responsibilities. • To facilitate sharing of information between RMAs and the community.
WDC	<ul style="list-style-type: none"> • Discuss with residents impact of upstream development on flood risk • Work with residents on a Community Flood Plan
Thames Water	<ul style="list-style-type: none"> • Be part of discussions on flood management to ensure provision of service is maintained • Look at provided return valves on sewer pipes to prevent foul water coming into houses during a flood
Riparian Landowner	<ul style="list-style-type: none"> • Undertake clearance of vegetation and debris on any adjacent ordinary watercourses (including ditches) and main rivers with guidance from relevant RMAs. • To follow the guidance given in the EAs booklet 'Living on the Edge' about their responsibilities as riparian owners.
Residents	<ul style="list-style-type: none"> • Take measures to protect themselves and their property when flooding is imminent. • Sign up to flood warnings if their property is at risk • Continue to document and photograph flood incidents where possible and report flooding to WDC, BCC and EA.

05/05/15

Explanation of Terms and Acronyms

Acronym	Definition
AOD	Above Ordnance Datum
BCC	Buckinghamshire County Council
Bucks CC	Buckinghamshire County Council
EA	Environment Agency
FWMA	Flood and Water Management Act
LLFA	Lead Local Flood Authority
PFRA	Preliminary Flood Risk Assessment
RMA	Risk Management Authority
WDC	Wycombe District Council
TfB	Transport for Buckinghamshire
TW	Thames Water

References

Reference in Document	Refers to
BCC, 2013	BCC Local Flood Risk Management Strategy (2013-2018), BCC, Aylesbury
BCC, 2011	Buckinghamshire County Council (2011). Preliminary Flood Risk Assessment. BCC, Aylesbury.
EA, 2014	Environment Agency flood map http://maps.environment-agency.gov.uk/wiyby/wiybyController?x=357683.0&y=355134.0&scale=1&layerGroups=default&ep=map&textonly=off&lang=e&topic=floodmap&utm_source=Poster&utm_medium=FloodRisk&utm_campaign=FloodMonth13 Contains Environment Agency information © Environment Agency and database right
Flood and Water Management Act (FWMA)	https://www.gov.uk/flood-risk-management-information-for-flood-risk-management-authorities-asset-owners-and-local-authorities

05/05/15

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

District Council



Wycombe District Council,
Queen Victoria Road,
High Wycombe,
HP11 1BB

Telephone: 01494 461 000

Email: info@wycombe.gov.uk

Website: <http://www.wycombe.gov.uk>

Highways Authority

Transport for Buckinghamshire

Telephone: Transport and roads – 0845 2302882

Out of hours emergencies (Highways) – 01296 486630

Email: ffb@buckscc.gov.uk

Website: <https://www.buckscc.gov.uk/services/transport-and-roads/report-a-highways-problem/>

05/05/15

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: <https://bucksfire.gov.uk/>

Thames Valley Police

Telephone: 101 in non-emergency, 999 in emergency

Website: <https://www.thamesvalley.police.uk/>

Buckinghamshire Ambulance Service

Telephone: 111 in non-emergency, 999 in emergency

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