Executive Summary

The flood event of winter 2013/14 covers the period from mid-December 2013 to early March 2014, during which time a significant number of settlements in West Berkshire were affected by flooding as a result of prolonged, persistent and heavy rainfall. The scale and magnitude of the majority of the flooding could not have been predicted.

This report provides an investigation into the causes, mechanisms, consequences and responses associated with flooding in each of the affected areas within West Berkshire.

Between the beginning of April and the end of June 2014 research was undertaken across the district, comprising interviews with Flood Wardens, Parish and Town Council representatives and affected residents, site surveys and analysis of data gathered by West Berkshire Council during the floods.

This research has enabled the production of a series of individual parish reports and maps, depicting the flooding experienced by each of the affected settlements in West Berkshire during the winter 2013/14 flood event. The supporting maps illustrate the affected properties, the approximate flood extents and the directions flood flows took through the town or village.

The information obtained from this investigation has highlighted the need for the initiation of a number of general, district-wide measures. These requirements range from better targeted and more regular maintenance of both public and private drainage systems, to formalised flood attenuation areas, to gathering data on the condition of features and structures which help prevent flooding. A series of location-specific recommendations have also been proposed to help mitigate the impact of future flooding in each town and village. The recommendations cut across all flood risk management authorities with responsibility for delivery against each measure shown within the report.

Lessons have been learnt and much work is required in terms of emergency response to ensure that communities are better able to mitigate and cope with future flood events.

1 Introduction

1.1 Background

During winter 2013/14 much of the country was battered with heavy rain and winds, resulting in wide scale flooding. For the most part of 2013 rainfall totals were slightly below the long term average. However, from mid-December a succession of deep Atlantic low pressure systems caused torrential rain and strong winds. This extreme weather was fuelled by a powerful jet stream, causing it to continue throughout January and February. Areas in the south-east of the country received almost 2.5 times the volume of rainfall than expected over an average winter period. For the country as a whole, the winter, from the beginning of December until the end of February, was the wettest recorded in the UK since records began in 1766.

Between the 13th December and Christmas Day the total rainfall across West Berkshire was up to 100mm in places, resulting in the River Kennet, River Lambourn and River Pang all bursting their banks. The River Thames did not burst its banks in December as there was still capacity in the river system at this time.

Several dry days between Christmas and New Year allowed river levels to subside. This was followed by a second period of heavy rainfall around New Year and the first week of 2014, with rainfall totals between the 30th December and the 8th January averaging 90mm.

At the end of January, levels in the rivers began to slowly fall. However, heavy and sustained rainfall at the end of January and during the first week of February caused levels to rise once again. The unrelenting rainfall throughout January and February resulted in water levels on the Lower Thames reaching their highest level for more than 65 years.

The worst affected areas were those along the line of each of the three river valleys that span West Berkshire; the River Pang, the River Lambourn and the River Kennet. The river and groundwater levels in all three catchments were high throughout the period. The repeated storms generated maximum levels on these rivers and other tributaries of the River Thames in West Berkshire. This resulted in even more water being added to an already inundated Thames floodplain. The location of these rivers is illustrated in figure 70003227/1/102.

The prolonged rainfall also resulted in groundwater levels in parts of West Berkshire rising drastically. Groundwater flooding caused more concern than flooding from the rivers across the majority of West Berkshire during this winter, with the worst affected areas being East Ilsley, West Ilsley, Great Shefford and Newbury.

Figure 70003227/1/101 illustrates the areas affected by flooding during the winter 2013/14 flood event based on the total number of properties that suffered internal and/or external flooding across West Berkshire.

1.2 Parish Flood Investigation Reports

The following reports give a parish by parish account of how the flooding occurred, the impact of the flooding and potential measures to reduce the likelihood and/or impact of future flooding events.

It should be noted that much of the following record has depended upon anecdotal evidence from members of the public. Solutions at this stage have been based upon site observations only. Prior to taking any recommendations forward, a feasibility study should be undertaken to verify the cause and effect of the flooding and the viability of solutions. For example, in cases where enlarging culverts has been discussed, this has been done in the context of relieving upstream flooding; no assessments have been made at this stage into the viability of these culverts (in terms of other services, ground conditions etc.) or into the downstream impacts of the resulting increased flow.

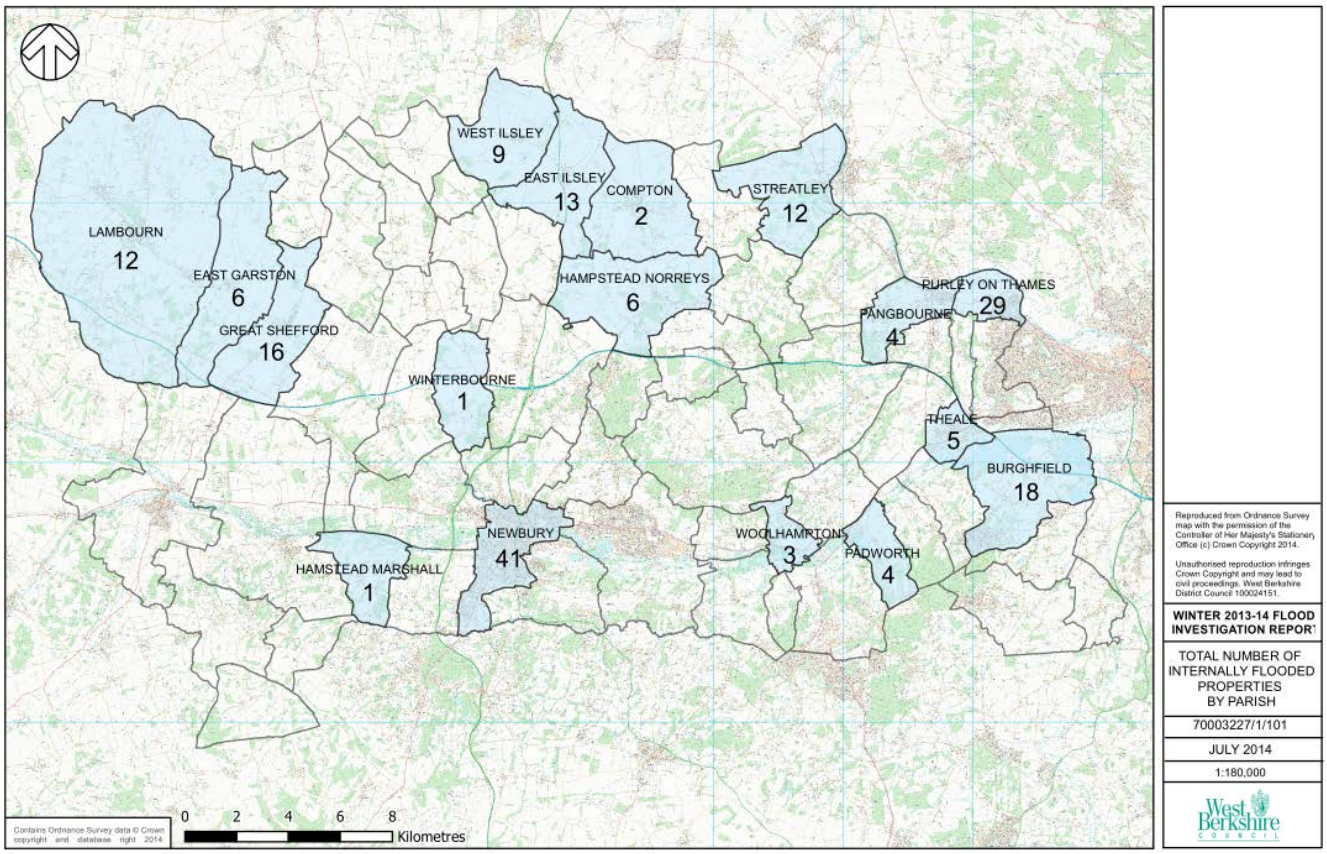

Figure 70003227/1/101: Total Number of Internally Flooded Properties by Parish

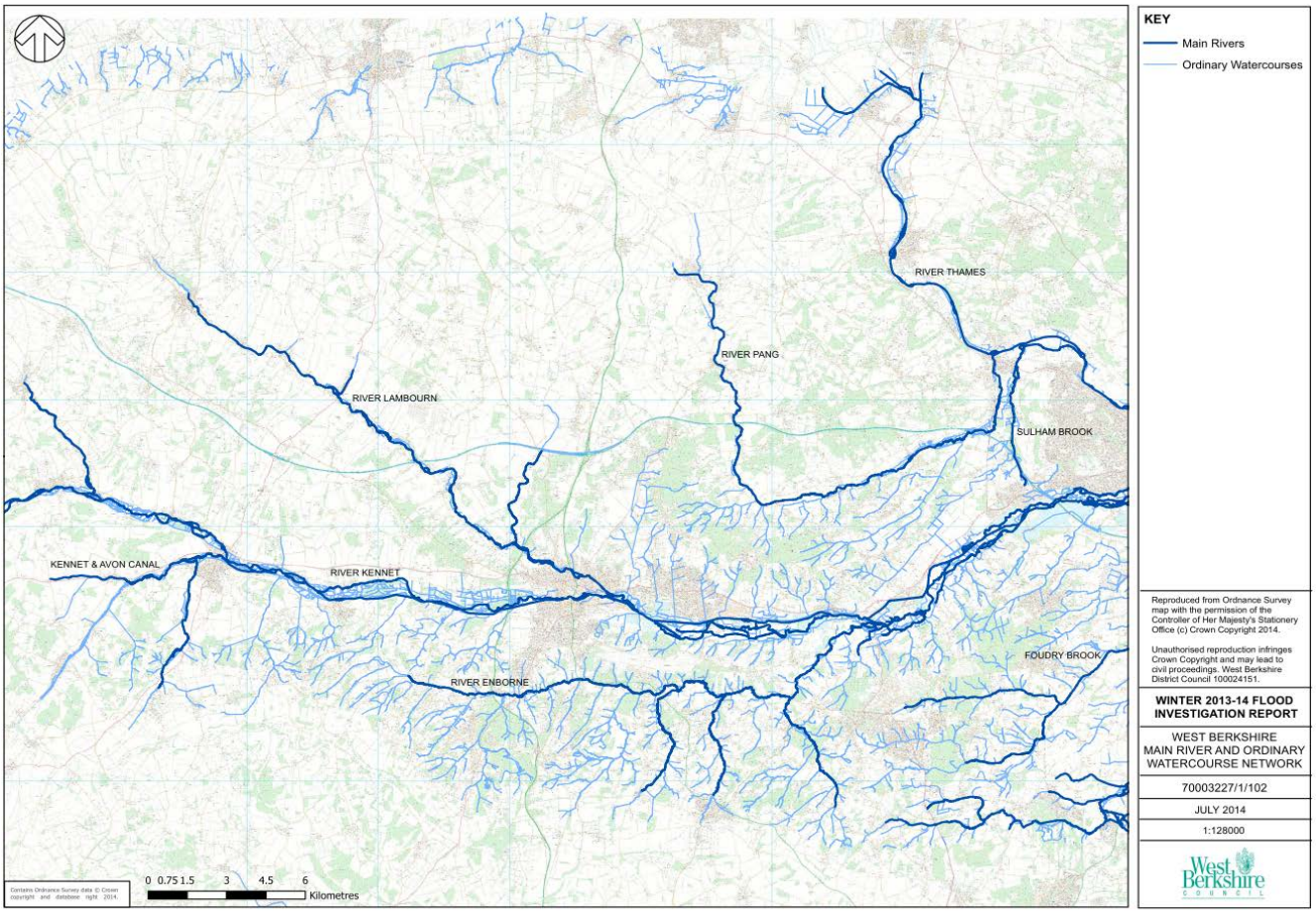

Figure 70003227/1/102: West Berkshire Main River and Ordinary Watercourse Network

2 Flood Risk Management Roles and Responsibilities

2.1 West Berkshire Council

West Berkshire Council, as the Lead Local Flood Authority (LLFA), is responsible for taking the lead on managing flood risk from local sources. This includes surface water, groundwater and ordinary watercourses, including where an interaction between various sources results in river flooding. Under the Flood and Water Management Act 2010 the Council, as LLFA, has a duty to investigate and publish reports on flood events (to the extent it considers necessary) and to compile and maintain a register of structures and features that have a significant effect on flood risk. It also has responsibility for consenting on third party works to ordinary watercourses.

The Council also has other related roles in planning and development control, public health, emergency planning and highway drainage.

West Berkshire Council is also the Highway Authority and has the following powers and duties:

- maintain highways, including ensuring that highway drainage systems are clear and that blockages on the highway are cleared;
- deliver works that they consider necessary to protect the highway from flooding, either on the highway itself or on land which has been acquired by the Highway Authority in the exercising of highway acquisition powers; and
- divert parts of watercourses or carry out any other works on any form of watercourse if it is necessary for the construction, improvement or alteration of the highway or provides a new means of access to any premises from the highway.

2.2 Environment Agency

The Environment Agency is responsible for providing a national strategic overview of flooding from all sources (including rivers, surface water and groundwater). The Environment Agency is also responsible for managing flood risk from Main Rivers.

The Environment Agency has a key role in providing flood warnings to the public and in protecting and improving the natural environment.

The Environment Agency has permissive powers to reduce flood risk by undertaking work on Main Rivers and flood defence structures.

2.3 Thames Water

Thames Water has responsibility for the public foul and surface water sewer systems in its ownership. Thames Water is also responsible for treating sewage from its foul network and to empty and dispose of the contents of their sewers. The Water Company has a general duty (under Section 94 of the Water Industry Act 1991) to provide, extend and improve public sewer systems, ensuring they are ‘effectually drained’.

Thames Water must also maintain a register (know as the DG5 Register) of flooding from sewers. The DG5 Register records information which is used to apply for investment funds from Ofwat to undertake improvements or repairs. Investment is agreed with Ofwat on a five year cycle referred to as Asset Management Periods (AMP). The current AMP runs from 2010-2015. The Investment plan for the next period 2015-2020 is currently under development.

2.4 Parish Councils and Community Emergency Groups

Parish Councils have no formal duties in the management of flood risk. However, Parish Councils can be instrumental in establishing local flood resilience partnerships and assisting in the development of Community Flood Plans as they typically have the local knowledge needed to help manage flood risk.

Parish Councils are encouraged to recruit Community Emergency/Flood Wardens, who will manage local flood risk by:

- working within their communities to prepare them for flooding and to develop flood resilience;
- receiving flood alerts/warnings from the Environment Agency directly and ensuring the community is aware of them;
- ensuring the community is aware of what the Environment Agency flood warnings mean, what people need to do and where further information can be obtained;
- assisting during floods by supporting people in the community;
- being a conduit for the flow of information between West Berkshire Council and the community;
- identifying vulnerable people within the community who may need special assistance during flood events; and
- reporting blocked drains, ditches and other watercourse issues to the relevant authorities.

A number of Community Emergency/Flood Wardens were operating in parts of the district prior to the winter 2013/14 flood event, including in Lambourn, East Garston, Eastbury and Great Shefford. These communities have noted the advantages of such wardens, but there is a need to recruit and train more people to ensure all communities in the district are effectively covered and that they work together. Following the 2013/14 flood event a number of additional communities have nominated Community Emergency/Flood Wardens, including East Ilsley and Hampstead Marshall.

2.5 Riparian Landowners

Landowners whose property is adjacent to a river, a stream or a ditch are likely to be ‘riparian owners’. Riparian owners have a responsibility to maintain the bed and banks of any watercourse within or adjacent to their property, in most cases even if that watercourse is adjacent to a highway, and to ensure there are no obstructions to the natural flow of water.

2.6 Property Owners

Responsibility for protecting property from flooding lies in the first instance with the property owner. Property owners whose home or business premises are located in areas known to be at risk of flooding should consider making their own flood defence preparations. Property owners also have a common law duty to mitigate their losses during a flood event.

3 Types of Flooding

There are several forms of flooding that affect West Berkshire. A brief overview is provided below. It is however, important to emphasise that the causes of flooding are not always certain and cannot always be attributed to just one source of flooding.

3.1 Groundwater Flooding

Groundwater flooding occurs when water levels in the ground rise above the ground surface. Groundwater flooding occurs after long periods of rainfall and can last for several weeks or even months. The areas most at risk are often low-lying areas where the water table is more likely to be at a shallow depth in relation to the ground surface. Groundwater flooding can be predicted well in advance by the Environment Agency who monitor groundwater levels throughout the year. Groundwater flooding in parts of West Berkshire is a significant contributor to other flooding types.

Groundwater flooding is attributed as a significant component of the flooding experienced in parts of West Berkshire in the winter of 2013/14; notably in the settlements of East Ilsley, East Garston and Great Shefford.

3.2 River Flooding

River flooding, also known as fluvial flooding, occurs when a river channel cannot accommodate the volume of water flowing into it, causing water to burst its banks onto the surrounding land or flood plains. These events normally follow an extended period of heavy rainfall and can usually be predicted by the Environment Agency and Met Office.

River flooding is attributed as a significant component of the flooding experienced in the a number of settlements during the winter of 2013/14, including Streatley, Pangbourne and Purley on Thames.

3.3 Surface water Flooding

Surface water flooding, also known as pluvial flooding or flash flooding, occurs when heavy rainfall generates runoff which flows over the ground and ponds in low lying areas. This type of flooding is usually short lived and associated with heavy downpours of rain. Surface water flooding is made much worse when the ground is already saturated and little rainfall can infiltrate. Often there is limited advance notice of surface water flooding; however, weather forecasts from the Met Office can give an indication of the flood risk.

3.4 Sewer flooding

Sewer flooding occurs when a sewer network cannot cope with the volume of water entering it or when the pipes within the network become blocked. Due to the age of much of the sewer network it is also possible for groundwater to enter into it and surcharge its capacity.

Flooding of / from sewers is attributed as a significant component of the flooding experienced in the settlements of East Ilsley, Padworth and Purley on Thames during the winter of 2013/14.

3.5 Highway flooding

Highway flooding is caused by heavy rainfall which, coupled with blocked drains, gullies or roadside ditches, causes water to pond within the highway.

3.6 Climate change

There is an increasingly large body of evidence indicating that periods of substantially heavier rainfall experienced in recent years are related to a changing climate. Although it is not possible to attribute single

events to global warning because of the natural variation of the weather, extreme rainfall is consistent with the predictions for global warning, i.e. more frequent and intense rainstorms and many more days of heavy rainfall in the winter. Those residents that are at risk of flooding may therefore be susceptible to more frequent and more severe flooding in future years as a result of climate change.

4 Investigations

4.1 Flood Wardens and/or Parish & Town Council Details

This report was prepared with the assistance and co-operation of Flood Wardens and/or Parish and Town Council representatives throughout West Berkshire. Table 4-1 details the affected parishes and the relevant contact(s) that assisted with the investigation.

A series of discussion points and questions were posed to the Parish and Town Councils by email, along with a request to meet with the relevant Flood Warden and/or Parish/Town Council representative. Meetings were arranged with each of the contacts to undertake a site walkover and discuss the flood event.

Much of the information in each of the investigation reports is based on the anecdotal information provided by Flood Wardens and Parish and Town Council representatives.

Table 4-1: Parish contact details

	Parish/Town	River valley	Primary source of flooding	Contact	Flood Warden/ Parish/Town Council representative/ Resident
1	West Ilsley	River Pang	Groundwater	Dries Hagen	Flood Warden
2	East Ilsley	River Pang	Groundwater	Mark Richardson	Flood Warden
				Rich Fielding	Flood Warden
3	Compton	River Pang	Groundwater	Peter McGeehin	Flood Warden
4	Hampstead Norreys	River Pang	Groundwater & Main River	Tim Mills	Flood Warden
5	Lambourn	River Lambourn	Groundwater	Sue Cocker	Parish Council representative
				Nick Spence	Flood Warden
				Caroline Potter	Flood Warden
6	East Garston	River Lambourn	Groundwater & Main River	Alan Breadmore	Parish Council representative
7	Great Shefford	River Lambourn	Groundwater & Main River	Gareth Knass	Parish Council representative
				Steve Ackrill	Flood Warden
				Linda Bowden	Flood Warden
8	Boxford	River Lambourn	Groundwater & Main River	Joy Appleton and Mark Sefcick	Parish Council representative and Flood Warden
9	Winterbourne	River Lambourn	Groundwater & Main River	Jill Hoblin	Resident
10	Bagnor	River Lambourn	Main River	Steve Mills	Resident
11	Newbury	River Lambourn/ River Kennet	Groundwater & Main River	Elizabeth O'Keeffe	Flood Warden
12	Woolhampton	River Kennet	Main River	Tony Renouf	Parish Council representative
13	Theale	River Kennet	Main River	Ewan Dalton	Resident
14	Burghfield	River Kennet	Main River	Paul Lawrence	Parish Council representative
				Clayton White	Flood Warden
				Lucinda Becker	Flood Warden
				Del Shackleford	Flood Warden
15	Padworth	Sewer	Sewer	Pam West	Resident
16	Hamstead Marshall	Enborne	Surface Runoff	Anne Budd	Parish Council representative
17	Streatley	River Thames	Main River	Nicola Swan	Parish Council representative
18	Pangbourne	River Thames	Main River	Heather Leighton-Jones	Parish Council representative
				Stephen Billyeald	Flood Warden
				Kay Lacey	Flood Warden
19	Purley on Thames	River Thames	Main River	Bernie Nix	Parish Council representative
				Fiona Williamson	Resident

4.2 Other Sources of Information

West Berkshire Council Highway Maintenance Officers

The Council's Highway Maintenance officers are responsible for inspecting and maintaining highway infrastructure in the district. These officers visited a number of the affected locations during the winter 2013/14 flood event. The information they collected during these visits and their existing knowledge of the district has contributed to the preparation of this report. With their knowledge of the district and their experience during the emergency period, they were able to highlight problem areas and offer potential solutions.

West Berkshire Emergency Operations Centre (EOC)

The EOC was operational throughout the winter 2013/14 flood event, during which period extensive records of complaints, service requests and flooded properties were logged. The EOC log was made available for this study and cross referenced against other data received, in particular that from the Parish and Town Councils.

Photographs

Photographs of the flooding throughout West Berkshire were obtained, including aerial photography of some of the worst affected areas along the River Pang and River Thames. These photographs provided an insight into the extent of the flooding and gave an indication of how badly certain areas were affected.

4.3 Impact and Effect of the Flooding

The winter 2013/14 flood event significantly impacted nineteen parishes in West Berkshire, with twenty-three individual towns and villages within these parishes experiencing internal and/or external property flooding. Several of the parishes which did not experience property damage experienced minor flooding of highways. This minor flooding is not discussed in this report.

The degree and extent of flooding experienced varied considerably between locations, with some villages only suffering external flooding to a handful of properties, whilst others had tens of properties flooded internally to the extent that the residents had to leave their homes. When undertaking the site visits for this study between April and June 2014, approximately 20 houses were still uninhabited as a result of the damage caused by the flood water.

Further information on the effects and source of the flooding in each of the affected areas is provided in the individual parish reports.

Table 4-2 summarises the properties that flooded in each of the parishes and towns during the winter 2013/14 flood event.

Table 4-2: Impact of flooding in each Parish

	Parish/Town	Total No. of properties flooded	No. of properties flooded internally	No. of properties flooded externally	No. of properties with cellar/garage flooding
1	West Ilsley	15	9	1	5
2	East Ilsley	15	13	1	1
3	Compton	7	2	2	3
4	Hampstead Norreys	14	6	8	-
5	Lambourn	21	12	9	-
6	East Garston	17	6	10	1
7	Great Shefford	37	16	21	-
8	Boxford	6	-	6	-
9	Winterbourne	12	1	11	-
10	Bagnor	7	-	7	-
11	Newbury	60	41	18	1
12	Woolhampton	10	3	7	-
13	Theale	11	5	6	-
14	Burghfield	22	18	4	-
15	Padworth	4	4	-	-
16	Hamstead Marshall	2	1	1	-
17	Streatley	26	12	11	3
18	Pangbourne	24	4	20	-
19	Purley on Thames	56	29	20	7
	TOTAL	**366**	**182**	**163**	**21**

4.4 Emergency Response to the Flooding

The emergency response to the flooding varied for each risk management authority and for each location. This section provides an overview of the types of response undertaken by each of the risk management authorities, with further details, specific to each location, provided in the parish reports.

West Berkshire Council

West Berkshire Council's response primarily involved closing flooded roads that were impassable or worsening the flooding to properties alongside the highway and providing sandbags to at risk or affected residents. The Council also undertook work to clear blocked structures and alleviate flooding where possible. In a small number of locations pumps were provided by the Council and tankers were directed to reduce the volume of water. The activities were prioritised on a risk based approach.

The Environment Agency

The Environment Agency issued a number of groundwater and surface water flood alerts and warnings for areas of West Berkshire. In the main, these warnings were issued in good time and those at risk were made aware. A small number of Parish and Town Council representatives noted that these warnings were issued after the flooding had begun and removed before the end of the flood event, and that a few residents were not informed, despite being signed up to the Environment Agency Floodline Warnings Direct service.

The Environment Agency provided pumps to some of the worst affected locations and their officers were present in a number of the affected locations. These officers were mostly checking residents were coping and supported where necessary. It is understood this type of response was not prioritised.

Thames Water

Thames Water provided pumps and tankered water from a small number of affected areas to alleviate the risk or extent of sewage flooding where issues were experienced with the foul water network. Prior to undertaking these works, Thames Water officers visited some of the affected towns and villages to assess the issues.

Thames Water cleared and cleaned areas of sewage in the majority of affected locations, although the speed at which this was undertaken, following the occurrence of flooding, was not always found to be satisfactory by residents.

Berkshire Fire and Rescue Service

The Berkshire Fire and Rescue Service assisted by alleviating the build-up of flood water in a small number of locations by undertaking pipe removal and pumping flood water.

5 Recommendations

Following analysis and consideration of the winter 2013/14 flood event, the following general recommendations should be considered in order to alleviate the risk of flooding in West Berkshire in the future. Specific recommendations have been made for each of the affected areas in the individual parish reports.

Maintenance

Public Surface Water System

The agreement of Thames Water should be sought to their carrying out regular inspections and, where found necessary, cleansing of the public surface water system, particularly in areas known to be susceptible to flooding. The resulting schedule of maintenance / works should be shared and agreed with the relevant Parish Councils.

Public Foul Water System

The agreement of Thames Water should be sought to their carrying out regular inspections, and where found necessary, repairs to the public foul water system, particularly in areas known to be susceptible to groundwater and surface water ingress.

Thames Water have committed to lining a significant portion of the foul water network in the Lambourn valley. For further details, refer to the parish reports.

Highway Drainage System

West Berkshire Council should continue to provide and develop drainage cleansing services on a risk management basis in accordance with the Code of Practice for Highway Maintenance Management 'Well Maintained Roads', July 2005. The schedule of works should be shared with the general public via the Council's website.

Watercourses

West Berkshire Council should encourage local flood wardens and/or town/parish council members to undertake regular inspection of watercourses in their area and to report identified issues to West Berkshire Council for review and action where necessary.

West Berkshire Council should share / agree a register of critical watercourses and/or structures with local flood wardens and/or town/parish council members warranting regular inspection to ensure that ditches, ponds and watercourses in private ownership are properly maintained

There are also a number of structures associated with the watercourses in West Berkshire that need to be regularly maintained to ensure they do not increase the risk of flooding in certain locations. West Berkshire Council should liaise with the Environment Agency and landowners, where relevant, to ensure adequate maintenance is undertaken in relation to these structures.

Flood Alleviation Works and Proposed Drainage Improvements

A number of capital schemes are recommended for specific locations as detailed in the individual parish reports. These capital schemes are intended to help alleviate the risk of flooding in certain locations. These schemes range from formalised flood alleviation basins, to the replacement of culverts, to the installation of property level protection measures.

Solutions at this stage are based upon site observations only. Prior to taking any recommendations forward, detailed studies will be required to ensure that solutions are technically, environmentally and economically sound.

The various recommendations in each of the parish specific reports have been categorised into Maintenance, Minor Works, Major Works or Other Works. For the purpose of classification, Major Works are those with an estimated works cost of £5,000 or more.

Detailed studies are required for Major Works to determine affordability and cost benefit. Where larger schemes affect assets owned by a number of stakeholders, a partnership approach should be explored to fund the optimum solution.

Preparation for future events

West Berkshire Council should develop a list of critical trash screen and culvert locations to ensure screens on culvert entry and exit points and on balancing pond overflows are inspected and kept clear. Once the various locations are established, West Berkshire Council should contact the relevant Flood Warden / Parish Council representative to establish the condition / maintenance status of the trash screen and/or culvert. This information will enable the Council to proactively manage their flood response as opposed to reactively responding to calls once flooding has occurred.

Planning and Development Control

The issues and recommendations within this document should be taken into account by West Berkshire Council Planning and Development Control teams when assessing the suitability of future development. A number of the affected areas cannot reasonably be protected from the consequences of flooding similar to that experienced during winter 2013/14. At best, only reactive measures can be provided in these areas. Additional development in these areas should be avoided.

Disclaimer

The information contained in this document has been compiled for the guidance of West Berkshire Council drainage engineers only. West Berkshire Council does not accept any liability for any inaccuracies in the information contained in this document.

Glossary of Terms and Definitions

Balancing Ponds: large concave areas of open land designated to temporarily accommodate excess surface water, when a storm generates runoff in excess of the capacity of the drainage system.

Borehole: there are a series of boreholes managed by the Environment Agency which are used to monitor groundwater levels in the aquifer deep beneath the downland areas of West Berkshire.

Borehole Monitoring: groundwater levels in the aquifer are monitored throughout the year by the Environment Agency. During the winter months, as levels begin to rise, the frequency of monitoring is increased and the results are passed to West Berkshire Council for information purposes.

Canal: the Kennet and Avon canal, which passes through West Berkshire, takes two forms; the major part was entirely manmade, whilst the remainder was formed by canalising the existing river. Management of the entire canal and maintenance of the manmade sections is the responsibility of the Canal and Rivers Trust. Responsibility for the maintenance of the canalised sections rests with the riparian landowners.

Climate Change: a long-term change in the statistical distribution of weather patterns over periods of time that range from decades to millions of years. Climate change may be limited to a specific region, or may occur across the whole planet.

Culverts: pipelines usually of a fairly large diameter (450mm or greater) which convey surface water through a catchment to outfall to a river or other major watercourse. Culverts were mostly formed by piping natural watercourses. Maintenance is generally the responsibility of Thames Water except where culverts pass beneath highways, where responsibility passes to West Berkshire Council.

Ditches: channels usually man made, cut for the purpose of conveying surface water runoff to streams and rivers. Maintenance is typically the responsibility of the riparian landowner.

Drains: pipelines which convey foul sewage or surface water runoff from a single property. A drain is still a drain, even if it passes outside of a property boundary, until it joins a sewer. Maintenance is the responsibility of the property owner.

Floodplain: this is a natural feature and is defined as an area of land along the course of a river valley that has historically been the subject of flooding. Floodplain extents are detailed on statutory definitive maps published by the Environment Agency.

Flood Warden: a local volunteer responsible for raising awareness within the local community about the prevention of flooding and acting as a focal point for flood issues. The Environment Agency, Wokingham Borough Council and the emergency services can communicate directly with them if necessary.

Highway Drains: pipelines which convey surface water runoff from the public highway only. Highway drains discharge to public sewers, watercourses and rivers. Maintenance is the responsibility of West Berkshire Council.

Highway Grips: small channels which cut through highway verges to convey surface water runoff from the highway directly to roadside ditches or watercourses. Maintenance is the responsibility of West Berkshire Council.

Highway Gullies: receive surface water runoff from the highway, trapping minor debris before the water is discharged into the highway drains. Maintenance is the responsibility of West Berkshire Council.

Main River: 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 flow or water in, into or out of a main river. The Environment Agency's powers to carry out flood defence works apply to main rivers only. Main rivers are designated by Defra. There are seven main rivers which pass through West Berkshire, namely the Thames, Kennet, Lambourn, Pang, Enborne, the Foudry Brook and the Sulham Brook. Figure 70003227/1/102 shows the location of these watercourses.

Manholes: chambers constructed on sewers at changes of direction or level in the pipeline and for the purpose of gaining access for maintenance purposes.

Ordinary watercourses: any other river, stream, ditch, cut, sluice, dyke or non-public sewer which is not a Main River.

Private sewers: any sewers which are not public sewers. Maintenance is the responsibility jointly of the property owners/beneficiaries.

Public sewers: sewers which have been adopted as public sewers or were in use before 1st October 1937. Maintenance is the responsibility of Thames Water.

Riparian landowners: under common law riparian landowners are responsible for the maintenance of any watercourse within or adjacent to the boundary of their property. Where a watercourse is sited between two or more property boundaries each owner may be equally responsible. A riparian owner is responsible for the maintenance of the bank and bed to avoid any obstruction of flow in the watercourse.

Sewers: pipelines which convey foul sewage or surface water runoff from more than one property. Sewers may be either public or private.

Sluices: control structures on watercourses, primarily rivers and canals, constructed for the purpose of controlling water levels and flows. Maintenance is the responsibility of individual owners, however the Environment Agency has prescriptive management rights to enable them to maintain or operate the sluices should they need to.

Trash Screens: metal grilles fixed across the entry points to culverts to prevent children and animals gaining access and to prevent debris being washed in. Maintenance responsibility depends on the precise location but it generally the responsibility of either Thames Water or West Berkshire Council.

Trigger levels: based on past experience each borehole has been assigned a trigger level. The trigger level, which varies from borehole to borehole, is a datum level below ground, above which rises in the water table are more closely monitored. They do not indicate impending flooding.

West Berkshire Groundwater Scheme (WBGS): this scheme comprises a network of groundwater abstraction boreholes and pipes feeding into a main carrier pipe. The scheme was constructed in the 1970s to extract water from the chalk aquifers in West Berkshire to supply water to areas of London during times of drought. The scheme is owned and operated by the Environment Agency for Thames Water, who pays the operating costs.

Appendices – Flood Investigation Reports

West Ilsley

1.1 Introduction

1.1.1 The Parish of West Ilsley is located in the northern part of West Berkshire, close to the County border. The village of West Ilsley itself is surrounded by open agricultural land, with the A34 situated half a mile or so from the village. The village is situated on the valley floor and follows the historical course of the River Pang. Although the River Pang no longer flows through West Ilsley in a defined channel, when groundwater levels are high enough to cause emergence, the water is now diverted around existing properties in the valley.

1.1.2 There are no formal watercourses flowing through West Ilsley other than highway drainage ditches to the west and on Catmore Road.

1.1.3 In the winter of 2013-14 the village suffered flooding as a result of high groundwater levels. In addition to groundwater flooding, these high levels resulted in flooding from overland flows and inundation of the foul sewer network.

1.1.4 Nine properties suffered flooding to internal areas of their property with an additional six suffering external and/or cellar flooding. Main Street was flooded in several locations. Drawing N^{o}. 70003227/01/101 to 103 identify the flooded properties, the approximate flood extents and the directions overland flows took through the village.

1.2 Flooding in West Ilsley

Groundwater Flooding

1.2.1 West Ilsley first experienced groundwater related issues in early February, with a number of properties suffering cellar flooding.

1.2.2 On Saturday 15th February groundwater and overland flow from further west in the Pang Valley caused flooding in a large part of the village.

1.2.3 The field immediately west of Downs View and the rear garden of Downs View were flooded to a depth of 200mm. At its peak, the water level was approximately 70mm from causing internal flooding to the property. To help divert flood water from the property, village residents dug a trench along the northern side of the property to channel water from the rear garden to the culvert beneath Main Street. This channel has been filled in since the flood event.

1.2.4 Overland flow from the Pang Valley was channelled into West Ilsley via the ditch alongside Main Street, along Catmore Road and via the drainage ditch alongside Catmore Road. All of these channels flow into West Ilsley's first pond. The Main Street ditch passes in culvert beneath Catmore Road before flowing into the pond. This culvert measures approximately 450mm in diameter.

1.2.5 The pond has a single outflow measuring 150mm in diameter. This pipe was partially blocked during the site visit in April 2014. On Saturday 15th February a trench was dug from the pond to the highway to try and reduce the water level in the pond and prevent water from over-topping into the field behind the pond. Historically flooding in the field to the rear of the pond has caused flooding of properties to the east. A bund to the rear of the pond helps prevent water from over-topping. During the flood event additional material was built up behind this bund. Water did not over-top the bund during the flood event; however leakage from the pond contributed to the flooding in the field behind.

1.2.6 Flood water collected in the field behind the former Veterinary Surgery, causing flooding to three rooms. The water seeped into the property through the floor and walls. A number of channels and sumps were dug around the property and four pumps installed to try and reduce the water level in and around the property. An internal pump was also purchased. Subsequent investigations suggest that a breach of the highway drainage pipe, which runs beneath the garden to the west of the property, may have significantly contributed to the amount of water affecting the property.

1.2.7 The owners of the Veterinary Surgery purchased a petrol driven pump and removed flood water from the field behind the property twice a day. This action appeared to have an effect on the groundwater levels below the property.

1.2.8 Flood water in the field behind the Veterinary Surgery has historically caused external flooding to the property to the east of the Veterinary Surgery and the Village Hall. In an effort to prevent this, a trench was dug to direct water around the electricity sub-station and the Village Hall and onto Main Street. Although water flowed through this trench for several weeks, the property to the east of the Veterinary Surgery, the electricity sub-station and the Village Hall did not experience flooding. This temporary trench has been filled in since the flood event.

1.2.9 Main Street was flooded outside the Veterinary Surgery due to a surcharging highway drain at the entrance to the former Veterinary Surgery car park. The majority of this flood water flowed into the highway drain in front of the property. Investigations located a blockage and defective seal approximately 130mm downstream of the surcharging highway drain. New pipework and an updated collar were installed to repair the problem. It is understood that the broken seal had allowed water to leach into the garden of the Veterinary Surgery for some time, causing water logging and contributing to the high groundwater levels beneath the property.

1.2.10 Flood water also surcharged from a drain east of the Village Hall on Main Street. Further east along Main Street the road was flooded on the camber outside Morland Close.

1.2.11 The Old School experienced flooding in the rear garden. Water was heard flowing beneath the floorboards at the rear of the house. A pump was installed in an exposed well at the rear of the property. This localised reduction in the water level is understood to have prevented any internal flooding.

1.2.12 Further east along Main Street N^{o}. 2 and 4 Fir Tree Cottages suffered internal flooding from groundwater to a depth of approximately 50mm. Both cottages are assisted living accommodation; one resident moved out with emergency support due to the extent of the flooding; the other chose to stay in the property. A pump was installed in a nearby soakaway in an effort to reduce the water level. It is thought this pumping made a significant difference to the water level in the properties. Water was observed bubbling up from the capped well in the courtyard of Fir Tree Cottages. This water is thought to have contributed to the flooding of N^{o}. 2 and 4.

1.2.13 North Cottage suffered internal groundwater flooding, with water seeping up through the floorboards. The foul water system backed up near North Cottage and it is thought foul water contributed to the flooding of North Cottage.

1.2.14 Foul water from the sewer in Main Street was also observed surcharging from the manholes in the garden outside the entrance to West Ilsley House. West Ilsley House is divided into a number of dwellings. The ground level of the property is approximately 1m below street level. The two dwellings at the front of the house suffered internal flooding from a combination of groundwater and foul water. These properties were pumping water from the beginning of February until early April.

1.2.15 On Tuesday 18th February the carriageway of Main Street was flooded outside Forge Cottage/The Old Forge, Campion/Elvira and The Poplars as a result of overflowing highway gullies. Both Elvira and the

Old Forge experienced flooding in the front garden as a result of the highway flooding. This flood water did not cause internal flooding of either property.

1.2.16 Rowles Farm, the Old Rectory, Manor Farm and Downs House pumped water from their cellars for approximately five weeks from early February. Downs House was pumping until mid-April. Manor House has not had to pump in over 60 years.

1.2.17 At the end of Main Street the highway drainage system flows beneath The Poplars to the second pond, which is a balancing pond. The Poplars experienced minor internal flooding of the utility room. This flooding was exacerbated by a drain located outside the rear entrance of the property. Water surcharged from this drain following heavy rainfall, flowing into the utility room.

1.2.18 Large volumes of water were also witnessed under the floor boards of the property, thought to be feeding an underground channel, which then fed a sump/cellar under the stairs. The Poplars pumped this sump/cellar for eight weeks from the middle of February.

1.2.19 Main Street was flooded from Campion/Elvira to The Poplars, to depths of 600mm, as a result of the overflowing highway gullies. The flood water from the highway flowed beneath The Poplars garden wall and along the driveway, flooding the front garden. The highway drainage network runs beneath the front garden of The Poplars. On lifting the highway manhole in the front garden during the flood event, the system was seen to be inundated. The driveway gullies, which are also connected to the highway drainage network, were also overflowing, contributing to the flooding in the front garden. The fire brigade were called to assist with the flood water on the highway due to the significant volume of water. Without the fire brigade pumping at this point, it is thought the east end of Main Street from Forge Cottage to The Poplars would have been flooded, putting several properties at risk of external and internal flooding.

1.2.20 The Poplars also pumped from a large soakaway (old cess pit) located in the middle of the front garden, which helped pull water off the drains closest to the house. It is not clear if this soakaway is connected to the highway drainage network, which flows through the garden.

1.2.21 Water discharges from the second balancing pond via a pipe beneath the driveway leading to Hodcott House. Water was emerging from the ground along the driveway, thought to be as a result of a breach in the pipe. A 125mm pump was installed to extract water from this pond as the outflow was not coping with the volume of water. It is thought the inability of the outflow to cope with volume of water from this pond contributed to the highway drainage network backing up beneath The Poplars.

1.2.22 The area outside the front of Hodcott House was completely flooded. An informal outflow and channel was dug to direct the water from the front of the house, past West Ilsley Stables, to the fields to the east.

1.2.23 Surface water flows did not enter Hodcott House, although the water level rose to within millimetres of the front door threshold. Groundwater flowed beneath the ground floor of the property, causing considerable damage to the floors and walls. Extensive remedial works are to be undertaken to repair the damage caused by the rising groundwater.

1.2.24 The owners of Hodcott House pumped water from the area outside the front of the property from the 6th February in an effort to ensure the house was not inundated by the flood water. Following the weekend of the 15th/16th February, West Berkshire Council called in Hertfordshire Fire and Rescue Service. The Fire and Rescue Service installed a High Volume Pump (HVP) on the afternoon of Monday 17th February. The HVP was replaced on the 2nd March by two Environment Agency supplied pumps, which were in use until the 15th April.

1.2.25 On the evening of Monday 17th February, Berkshire Fire and Rescue Service emergency response crews were dispatched to the village to assist with pumping from the following locations:

- The foul network in front of West Ilsley House into the road with a fire tender
- Outside Campion, Elvira and The Poplars with a fire tender
- Outside Forge Cottage with a fire tender.

These fire tenders remained in place for approximately one week.

1.2.26 The following weekend, two high volume pumps were deployed by the Fire and Rescue Service; one at Hodcott House and one at the point where flood water flowed over the road between East and West Ilsley. Whilst these emergency teams remained in deployment, the Parish Council were informed of their repatriation after approximately one week.

1.2.27 In the following weeks, in an effort to contain the flooding in the village, the Parish Council (using several Environment Agency supplied pumps) pumped from the highway drain outside the Old Forge, along Church Way, to the second balancing pond. From this point, the water was then pumped to the field beyond the Hodcott House stables. As a consequence, the pump at The Poplars was removed.

1.2.28 The village also experienced groundwater infiltration into the foul sewers, leaving many residents unable to use their toilets and discharge into the foul system for a period of several weeks.

1.3 West Berkshire Council Emergency Response

1.3.1 The West Berkshire Council Emergency Response team assisted in the evacuation of residents.

1.3.2 West Berkshire Council also provided the village with sandbags.

1.4 Risk Management Authorities

1.4.1 In addition to West Berkshire Council, the following Risk Management Authorities have relevant, flood risk management functions in West Ilsley:

- Environment Agency
- Thames Water

Environment Agency

1.4.2 Groundwater Flood Alert issued to West Ilsley on 29th January 2014.

1.4.3 The Environment Agency provided pumps to West Ilsley at Keeper's Stables (150mm diameter pipe), Forge Cottage (150mm diameter pipe) and Hodcroft House (100mm diameter pipes).

1.4.4 West Berkshire Council has not been made aware of any further action taken by the Environment Agency.

Thames Water

1.4.5 Thames Water provided a 4'' pump to West Ilsley House to pump sewage and groundwater.

1.4.6 West Berkshire Council has not been made aware of any further action taken by Thames Water.

Other authorities

Fire and Rescue Services

1.4.7 West Berkshire Fire and Rescue Service deployed crews to help with pumping at the foul network in front of West Ilsley House, outside Campion, Elvira and The Poplars and outside Forge Cottage.

1.4.8 Hertfordshire Fire and Rescue Service pumped water from outside Hodcroft House, using a HVP, onto the adjacent farmland

1.5 Recommendations

1.5.1 In order to reduce the risk of flooding in West Ilsley the following measures should be considered:

Maintenance

1.5.2 Regular maintenance should be undertaken of the highway drainage network in the village.

1.5.3 Both the first and second pond should be regularly maintained to clear excess silt build up and vegetation. The various ditches that feed into these ponds from the surrounding land should also be regularly cleared and maintained.

1.5.4 The outfall to the first pond should be regularly maintained to ensure water flowing out of the pond is not restricted.

Minor Works

1.5.5 A number of dredging markers could be installed in the first and second ponds to monitor the level of silt collecting in the ponds. These markers would indicate when dredging is required and the volume of silt requiring removal.

1.5.6 An investigation should be undertaken to understand the consequences of upgrading the outfall to the first pond. Installing a larger diameter outflow would allow a greater volume of water to discharge from the pond during a flood event, and reducing the risk of the pond overflowing. However this may result in an increased risk of flooding downstream. In order to ensure flood risk is not increased downstream, the investigation should also consider increasing the capacity of the drainage system from Forge Cottage to the second balancing pond.

1.5.7 An investigation should be undertaken into the options for holding up the runoff flowing down Catmore Road, such as a series of sumps, which contributes to the volume of water in the first pond.

1.5.8 An investigation should be undertaken to understand the consequences of formalising the temporary channel along the side of Downs View. Constructing a permanent channel would allow flood water to effectively drain from the field to the west of Downs View to the culvert beneath Main Street, reducing the risk of flooding to Downs View. However this may result in an increased risk of flooding downstream.

Major Works

1.5.9 In order to increase the capacity of the highway drain beneath Main Street, the drain should be upgraded to a 300mm culvert along the full length of Main Street. This will ensure flood water is safely channelled through the village, as well as being able to cope with highway runoff. These works would involve upsizing the network from The Poplars, which is already 300mm in diameter, to ensure it is able to deal with the additional volume from this point. The pipe which channels water from the second balance pond to the area in front of Hodcott House (informal third pond) should be upgraded, either using a larger pipe or by replacing the pipe with an open ditch to increase capacity and reduce the risk of flooding to the village. The informal outflow from the third pond, which was established during the flood event, needs to be made permanent. A swale could be installed to channel flows to the fields to the east, from which point the natural topography of the land will allow water to drain away without presenting a flood risk.

1.5.10 An investigation should be undertaken to establish a permanent solution for dealing with the rising water in the field behind the Veterinary Surgery.

1.5.11 The possibility of installing a pipe in place of the temporary ditch at Downside should be investigated. This pipe would take the water from the garden, beneath the road and into the ditch which runs alongside the cricket pitch.

1.5.12 In order to help protect The Poplars, subtle landscaping of the garden could be undertaken, to ensure any water that does pass through the garden does so without threatening internal areas of the property.

2 East Ilsley

2.1 Introduction

2.1.1 The Parish of East Ilsley is located in the northern part of West Berkshire, between the Parishes of West Ilsley and Compton in the valley of the River Pang. The village of East Ilsley is surrounded by open agricultural land, with the A34 situated immediately to the west. The village pond is located in the centre of the village at a topographic low point, resulting in the runoff from the surrounding roads flowing to this feature.

2.1.2 There are no watercourses flowing through or within the vicinity of East Ilsley village. The main sources of flood risk to the village are from groundwater and surface water runoff following heavy rainfall.

2.1.3 In the winter of 2013-14 the village flooded as a result of high groundwater levels. High groundwater levels entered into the sewer network causing flooding from the sewage system and resulting overland flows.

2.1.4 Fifteen properties experienced internal and/or external flooding, along Abingdon Road, Fidler's Lane, Broad Street and Cow Lane. Drawing N^{o}s. 70003227/02/101 and 102 identify the flooded properties, the approximate flood extents and the directions overland flows took through the village.

2.2 Flooding in East Ilsley

Groundwater Flooding

2.2.1 High groundwater levels resulted in an overland flow route from West Ilsley. This overland flow route passed beneath the A34 and then flowed through the fields to the west of Abingdon Road at the north side of the village. This overland flow path was observed to be flowing rapidly during the peak of the event.

2.2.2 Runoff from the fields is typically channelled into a drain in the field west of Abingdon Road. This drain flows beneath Abingdon Road to the pond in the centre of the village.

2.2.3 At approximately 10am on February 14th the water level in the fields rose rapidly; approximately 30cm in an hour. Residents attempted to prevent the water from leaving the field by laying a line of sandbags along the field boundary.

2.2.4 By midday water was spilling from the field, over the sandbags, onto Abingdon Road and flowing south towards the village centre. By the middle of the afternoon the cellars and ground floors of ten properties had flooded, including two pubs: The Swan and the Crown and Horns.

2.2.5 The Swan pub suffered flooding of the ground floor, whilst the cellar of the Crown and Horns was flooded. The Crown and Horns had to close for a few days as a result of the flooding and was still pumping water from its cellar in early April.

2.2.6 Abingdon Road was closed for approximately 1 ½ weeks from the 14th February.

2.2.7 The overland flow along Abingdon Road contributed to the flooding of Vine Cottage, Rose Cottage and Pear Tree House. The entrance to Vine Cottage is flush with the pavement level, which is almost the same level as the road. The entrances to Pear Tree House and Rose Cottage are approximately 500mm lower than the road level.

2.2.8 A number of properties on Abingdon Road pumped groundwater from their cellars and gardens to the highway for approximately five weeks from early February.

2.2.9 During the early hours of the 15th February the village experienced a power cut which prevented pumping. The electricity provider supplied generators to the village but it took a number of hours to get these operational. As a result a number of the properties that were formerly pumping experienced internal flooding to their ground floors.

2.2.10 Further south, two properties on Cow Lane, Long Cottage and Holyhock Cottage, both experienced groundwater flooding from early February through to the end of April. The water initially rose in the lounge of Long Cottage on the 7th February, rising to a depth of approximately 100mm. This flood water was confined to the lounge by pumping to Cow Lane until the 15th April, when, following the power cut, the water spread to four other rooms in Long Cottage and Holyhock Cottage. During the power cut the water was approximately 150mm deep. The depth of the water dropped back to 100mm once the pump was operational again; however the water remained in the properties until the end of April. The flood water surrounding the properties was approximately 150mm deep for the duration of the flooding.

2.2.11 Holyhock Cottage was empty at the time of the flooding; the residents of Long Cottage moved out and are not anticipated to be able to return to the property until February 2015 due to the extent of the damage caused by the flood water.

2.2.12 Extensive drainage systems were installed around the properties following the 2000 groundwater flooding in East Ilsley. These systems drain to the surface water network in Cow Lane. Due to the surface water network being inundated with flood water, these drains around the properties were unable to perform effectively.

2.2.13 On the afternoon of 14th February, Under Ridge, on the corner of Cow Lane and Church Hill, experienced groundwater flooding to the majority of the ground floor. The flood water reached a depth of approximately 50mm in the internal areas of the property. The elderly resident was evacuated the following day.

2.2.14 The internal flood depths ranged from approximately 30mm to 120mm. Due to the age of the properties in the village, the threshold levels and internal floor levels vary both between properties and within individual properties. A number of properties suffered further damage due to capillary action drawing water up the walls.

2.2.15 At least three of the properties affected along Abingdon Road were still uninhabited due to flood damage in early April.

2.2.16 Five properties were still pumping water from their cellars in early April.

Sewer flooding

2.2.17 High groundwater levels in the village resulted in groundwater seepage into the sewer network. As groundwater levels continued to rise the volume of water seeping into the sewer network increased and the system became surcharged.

2.2.18 Sewage was observed surcharging from manholes in the centre of the village for approximately 7 weeks from the middle of February until early April. When groundwater levels were at their peak, manholes were surcharging at a height of approximately 500mm. Water also emerged from cracks in the road surface on Abingdon Road, Fidler's Lane and Cow Lane.

2.2.19 On Sunday 16th February Thames Water sewer pumps at the East Ilsley Sewage Treatment Works failed, resulting in the sewers backing up and flooding the highway in the centre of the village. It is understood this failure was a result of insufficient diesel in the pumps.

2.2.20 Raw sewage accumulated at a number of locations in the village. In early April, raw sewage was still present at the junction of Abingdon Road and Fidler's Lane and in the field west of Abingdon Road, just south of the inlet to the drain which flows beneath Abingdon Road.

2.2.21 Three properties along Abingdon Road suffered sewer flooding to external areas of their property from February to April; Blewbury Cottage, Bartholomews and Pear Tree House.

2.2.22 Blewbury Cottage has a manhole in the front garden and in the garage. Both of these manholes surcharged, discharging sewage, which flooded the front garden. A number of channels were dug in the driveway in an attempt to channel the water away from the property.

2.2.23 Bartholomews suffered external sewer flooding as a result of sewage surcharging from the manholes along Abingdon Road. The access to Bartholomews is flush with the road level. The property also experienced internal flooding from groundwater.

2.2.24 Further south along Abingdon Road, Pear Tree House experienced sewer flooding in the rear garden as a result of sewage surcharging from a gulley located in the patio. This property also experienced internal groundwater flooding.

2.2.25 The manhole located in the highway in front of Under Ridge surcharged on the 16th February. This resulted in Under Ridge experiencing internal sewage flooding to a depth of approximately 50mm. This property previously suffered groundwater flooding on the 14th February. The flood water receded between the two events.

2.2.26 At the end of March sewage was observed bubbling from a manhole in High Street and a manhole in the grounds of Buffers, High Street.

2.2.27 Following heavy rainfall on the 7th April, Rainbow Cottage and the Old Post House experienced internal flooding from the sewer system.

2.2.28 Thames Water tankered water from the sewer system in the centre of the village for approximately 9 hours overnight on the 7th April. This pumping brought a stop to the sewage water surcharging from the manholes, and the village experienced no further problems from sewer flooding.

2.2.29 Abingdon Road will need to be resurfaced once groundwater levels have receded due to the sizeable cracks that have emerged where water was being forced up from beneath. A number of the roads in the centre of the village have also suffered cracking and surface damage due to the flood event.

2.2.30 Prior to this flood event East Ilsley did not have a Flood Warden; the village now has 3 volunteers undertaking this role.

2.3 West Berkshire Council Emergency Response

2.3.1 West Berkshire Council was notified of the rising levels in the field to the west of Abingdon Road by a resident on the morning of the 14th February. The Council provided sandbags to the village the same day.

2.3.2 The West Berkshire Council Emergency Response team assisted in the evacuation of residents and organised for the Army to assist in moving furniture and possessions upstairs within flooded properties.

2.3.3 Sandbags will be stored in East Ilsley for reuse in the future if necessary.

2.3.4 West Berkshire Council dredged the village pond in 2013 at the request of the Parish Council, as the pond had become silted as a result of highway runoff. The pond did not overflow during the Winter 2013-14 event.

2.3.5 Since the flood event, West Berkshire Council Highways have undertaken a CCTV survey of the highway drainage. This survey has found parts of the system to be badly rooted and silted.

2.4 Risk Management Authorities

2.4.1 In addition to West Berkshire Council, the following Risk Management Authorities have relevant, flood risk management functions in East Ilsley:

- Environment Agency
- Thames Water

Environment Agency

2.4.2 Fluvial Flood Alert issued on 23rd December.

2.4.3 Groundwater Flood Alert issued on 29th January.

2.4.4 Environment Agency representatives were present in East Ilsley during the event, helping with the response.

2.4.5 West Berkshire Council has not been made aware of any further action taken by the Environment Agency.

Thames Water

2.4.6 A Thames Water representative visited the village on the 2nd April, inspected the sewer system and confirmed that the issues were due to hydraulic overload (groundwater ingress).

2.4.7 A Thames Water investigation in East Ilsley was scheduled for the 8th April. Thames Water representatives were seen to be photographing the leaking manholes on the 6th April.

2.4.8 Thames Water tankered from the sewer network in the centre of the village for approximately 9 hours overnight on the 7th April. This water was taken to the pumping station to the south-east of the village. Residents reported that the water level in cellars and surrounding properties had receded by approximately 120mm by the following day.

2.4.9 A number of residents attempted to contact Thames Water for support during and after the flood event but were unsuccessful in receiving assistance.

2.4.10 Thames Water was not witnessed clearing and cleaning areas of raw sewage in the village. Areas of raw sewage were still present during early April.

2.4.11 Since the flood event, it is understood that Thames Water has undertaken a CCTV survey of the network in the village. The results of this survey are yet to be made public.

2.4.12 West Berkshire Council has not been made aware of any further action taken by Thames Water at the time of writing this report.

Other authorities

West Berkshire Fire Brigade

2.4.13 On the 14th February West Berkshire Fire Brigade removed a section of the pipe in the field to the west of Abingdon Road to enable water to flow more freely into this drain. This action significantly reduced the volume of water spilling from the field on to Abingdon Road.

2.4.14 The fire brigade also pumped water from the pond in the centre of the village to ensure the pond did not overtop. Residents in the village believe this was unnecessary and the pond had sufficient capacity to deal with the flood waters from this event.

2.5 Recommendations

2.5.1 In order to reduce the risk of flooding in East Ilsley the following measures should be considered:

Maintenance

2.5.2 The entrance to the pipe in the fields west of Abingdon Road, which runs beneath the road to the village pond, should be checked and maintained regularly to ensure it does not become silted up or buried within the field as this pipe is critical in allowing water to flow to the village pond and not along Abingdon Road. This would reduce the likelihood of the properties along Abingdon Road flooding from overland flows.

2.5.3 The village pond and the channel leading from the pond to the fields to the east of the village should be regularly maintained to clear excess vegetation and any obstructions in the channel. The gradients of the pond and the channel should be maintained to ensure water is encouraged to flow away from the village.

Minor Works

2.5.4 Works to raise the level of the field boundary along Abingdon Road would help ensure water is contained within the fields and does not spill over and flow along Abingdon Road. This would reduce the risk of overland flows along Abingdon Road and reduce the likelihood of properties in this part of the village flooding as a result.

2.5.5 During the flood event water was observed to have been attenuated in the fields downstream and to the east of the village. These fields could be formalised as a temporary retention area during times of high flow. This would help increase the capacity to store water, which in turn will delay the flow of water downstream to Compton and may allow water to discharge from the village pond at a greater rate, helping to lower the water levels in the village.

Major Works

2.5.6 The feasibility of raising the kerb heights along Abingdon Road should be investigated. These works could potentially reduce the likelihood of a number of properties on Abingdon Road being at risk of flooding in the future, serving to protect properties from water flowing along the highway. The camber of Abingdon Road causes water flowing on the road to flow towards properties in some places. The feasibility of addressing this issue should also be investigated.

Other Works

2.5.7 The cause of the large cracks in Abingdon Road needs to be investigated prior to the re-surfacing of the road. Water was seen to be being ‘forced up’ out of the ground through these cracks. If this is a result of damaged pipework beneath the road, then it will damage any re-surfacing works as well. If the cause of this water is found to be groundwater, this should be considered in the design of the road to stop this water ‘pushing’ the road up and causing damage. A CCTV survey of the drainage network along Abingdon Road would be of value to confirm the condition of the system at this location prior to any resurfacing work.

3 Compton

3.1 Introduction

3.1.1 Compton Parish is located in the north of West Berkshire, between the Parishes of East Ilsley and Hampstead Norreys. The village of Compton lies on the floor of the River Pang valley. The village is surrounded by open agricultural land and is the only significant centre of population in the Parish.

3.1.2 The River Pang becomes a main river to the north west of the village, above Mayfield Farm, and flows through the village in a ditch alongside the High Street, School Road and Aldworth Road. All of the surface water drainage systems in Compton drain to the River Pang. An ordinary watercourse, locally referred to as the 'River Roden', flows into the village from the north. Both watercourses are 'winterbournes', i.e. only flow during the winter months and are typically dry during the summer months.

3.1.3 During the Winter 2013/14 flood event the village flooded as a result of high groundwater levels. High groundwater levels also resulted in flooding from the sewage network and overland flows.

3.1.4 Six properties experienced internal, cellar and/or external flooding. Cheap Street, Aldworth Road, School Road, Coombe Road and Newbury Road also experienced flooding to varying depths. Drawing N^{o}s. 70003227/03/101 to 103 identify the flooded properties, the approximate flood extents and the directions overland flows took through the village.

3.2 Flooding in Compton

3.2.1 The River Roden began flowing on the 22nd January and the River Pang started to flow along the High Street ditch on the 5th February, fed by a combination of the overland flow route from East Ilsley, groundwater and surface water runoff. Both of these winterbournes were dry prior to these dates.

3.2.2 The water level in the village was highest between the 14th and 18th February.

3.2.3 On the 18th February Thames Water confirmed that the pumping station in the village was at capacity and that the system was overloaded due to groundwater ingress.

3.2.4 The River Pang flows into culvert east of Cheap Street. The entry to the culvert was blocked by debris prior to the flood event. As a result of this blockage, during the flood event, water spilled out of the river and onto the High Street, flooding the Doctors Surgery car park and the ground floor of High Street Cottage. The Cottage was flooded to a depth of approximately 100mm and was left uninhabitable as a result of the damage caused.

3.2.5 During the flood event the entrance to the culvert was cleared by the Environment Agency and the Parish Council. Water stopped spilling from the ditch as a result and the flood water receded.

3.2.6 The southern end of Cheap Street was flooded to a depth of approximately 300mm as a result of a blocked surface water drain. A number of foul manholes along Cheap Street also surcharged. This is thought to be due to groundwater ingress into the sewer system. Two cottages on the eastern side of Cheap Street came close to suffering internal flooding as a result of the flood water on the road. West Berkshire Council attempted to clear the drain on Cheap Street to alleviate the flooding. Water continued to flood the highway following each subsequent rainfall event. West Berkshire Council deployed tankers to reduce the water level.

3.2.7 Sewer manholes also surcharged on Horn Street, causing sewage approximately 150mm deep, to collect on the road. This water flowed off the highway into the Horn Street pond. Local residents believe

that the groundwater hydraulic pressure is enhanced locally due to the soakaway serving the Baxter Health Care premises.

3.2.8 Yew Tree House, located opposite the outflow from the River Pang culvert, suffered internal groundwater flooding in one room.

3.2.9 The River Roden flows beneath Wallingford Road in culvert. This culvert was unable to cope with the flow from the River Roden, causing water to spill out of the channel and flow onto the carriageway from the north. The road was flooded to a depth of approximately 100mm. The water flowed across the road and back into the culvert via four highway gullies.

3.2.10 The Forge House, Compton Manor and Roden House all experienced groundwater flooding in their cellars. This is a relatively common occurrence in these properties during the winter months. The flood water in the cellars was deeper and was observed to remain high for a longer period than typically experienced.

3.2.11 School Road and Aldworth Road were both flooded to a depth of 150mm and 300mm respectively. An apparent lack of capacity in the Burrell Road culvert caused water to back-up and spill out onto the highway on School Road. The water flooded Aldworth Road due to access crossings further downstream on Aldworth Road restricting the flow of water in the channel. The majority of the kerb drains in the affected area on School Road and Aldworth Road had reverse flow.

3.2.12 As a result of the flooding West Berkshire Council closed Aldworth Road.

3.2.13 Both Compton Church of England Primary School and The Downs School were closed on the 14th February for one day due to the flood water causing difficulties in getting children to school.

3.2.14 The foul sewer and utility manholes on Aldworth Road surcharged, due to groundwater ingress in the sewer system and utilities pipes. For the utility manholes to be surcharging groundwater pressure must have been significant. Property owners along Aldworth Road reported problems flushing toilets.

3.2.15 The southern-most extension of Coombe Road was flooded to a depth of 200mm as a result of water spilling out of the channel. South of the junction with Coombe Road, Newbury Road was closed due to 300mm deep flood water. A lack of capacity in the culvert is thought to be the cause of these incidences of highway flooding.

3.2.16 The footpath between Church Farm Cottage and Compton Sewage Treatment Works was closed due to flooding to a depth of 400mm on the section that runs alongside the eastern boundary of the Sewage Treatment Works, making it impassable.

3.2.17 Floodcross Cottage (just south of the Compton Parish boundary) was externally flooded. Its sceptic tank drainage failed. In early March 2014 West Berkshire Council removed the ground above the twin-pipe culvert under the field entrance immediately before the River Pang changes course by Floodcross. This alleviated the situation.

3.2.18 Two pumps were installed in the village. The first was installed on the 21st February in School Road, to the west of the junction with Burrell Road. Water was pumped to the River Pang south of Aldworth Road until the 27th February. A second pump was installed on the High Street on the 24th February. This pump was located at the entrance to the culvert, west of the junction with Cheap Street. Water was pumped approximately 1km east to the watercourse just upstream of the point where the School Road pump discharged, until the 6th March.

3.3 West Berkshire Council Emergency Response

3.3.1 West Berkshire Council closed the Aldworth Road and the High Street on the 11th February due the depth of flood water covering the carriageways.

3.3.2 Sandbags were provided to the village on the 11th February.

3.3.3 Compton Church of England Primary School and The Downs School were both closed on the 14th February for a day as a result of difficulties getting children to school. As this was the Friday before half term, the schools were only closed for one day, since flood waters had receded by 24th February when the school term re-started.

3.3.4 West Berkshire Council attempted to clear the drain on Cheap Street on 15th February to alleviate the flooding. Water continued to flood the highway following each rainfall event. West Berkshire Council deployed tankers on the 18th February to reduce the water level.

3.3.5 In order to alleviate the level and extent of flood water surrounding Floodcross Cottage, West Berkshire Council removed the ground on top of the two-pipe culvert under the field entrance.

3.4 Risk Management Authorities

3.4.1 In addition to West Berkshire Council, the following Risk Management Authorities have relevant, flood risk management functions in Compton:

- Environment Agency
- Thames Water

Environment Agency

3.4.2 The Environment Agency issued a fluvial flood alert for the River Pang valley from East Ilsley to Pangbourne on the 23rd December 2013.

3.4.3 Environment Agency representatives were present in Compton during the flooding event. Environment Agency officers helped clear the trash screen of the River Pang culvert.

3.4.4 West Berkshire Council has not been made aware of any further action taken by the Environment Agency.

Thames Water

3.4.5 A number of residents and the village Flood Warden attempted to contact Thames Water for support during and after the flood event but were unsuccessful in receiving assistance.

3.4.6 Thames Water monitored the capacity of the sewer system during the event.

3.4.7 Water pressure in the mains water supply was noted to drop in some properties in the village around the 18th February. Thames Water delivered pallets of bottle water to the village.

3.4.8 West Berkshire Council has not been made aware of any further action taken by Thames Water.

3.5 Recommendations

3.5.1 In order to reduce the extent of flooding in Compton the following measures should be considered:

Maintenance

3.5.2 The River Pang, which runs as a ditch alongside the High Street, School Road and Aldworth Road requires regular maintenance to clear excess vegetation and any obstructions to the channel.

3.5.3 The surface water sewer system which runs beneath the High Street, Cheap Street and Horn Street should be checked and maintained to ensure water is able to flow freely to the river.

3.5.4 The bank alongside Dennisford Road to the north west of Compton (leading off of the Ilsley Road, near East Ilsley Down) serves to hold back a large volume of groundwater fed overland flow from East Ilsley.

To ensure that this bank is not lowered or any section removed it is recommended that the bank be Designated by West Berkshire Council and added to the West Berkshire Council Asset Register.

Minor Works

3.5.5 Overland flow from East Ilsley and the surrounding area could be held back in the field to the west of the village, at the junction of Newbury Road and Ilsley Road. The risk to Mayfield Cottages would need to be established to ensure attenuating the water in this area does not increase the flood risk to these properties.

3.5.6 A number of the manholes in Horn Street need replacement covers as many are currently without covers.

3.5.7 The Burrell Road culvert and access crossings along Aldworth Road need to be assessed to determine their capacity during storm events. These structures should be altered where necessary to increase the capacity beneath them, reducing the risk of water backing-up along School Road and Aldworth Road.

Other Works

3.5.8 An investigation into the effects of the existing configuration and differing widths of the River Pang as it flows alongside Ilsley Road, High Street, School Road and Aldworth Road should be undertaken to determine if these modifications are causing issues with the flow of water.

3.5.9 An investigation into the capacity of the pipe which channels water from the fields north of Wallingford Road, beneath the road, to the Horn Street pond, should be undertaken to ensure the volume of water flowing through the pipe during storm events is contained within it.

3.5.10 Undertake a study of the watercourses through the whole village to establish the potential works that will help alleviate the flood risk in the village both currently and in the future, in light of the likely impacts of climate change.

3.5.11 An investigation should be undertaken into the feasibility and benefit of installing concrete end-faces to the culvert beneath the field entrance on Ilsley Road, upstream of the village. Currently this feature is supported by banked earth. Due to the location and importance of this feature, it is also recommended that it be added to the Asset Register.

4 Hampstead Norreys

4.1 Introduction

4.1.1 The parish of Hampstead Norreys is located in the River Pang Valley, in the centre of West Berkshire. The village lies on the side of a hill with the River Pang flowing from north to south through the eastern edge of the village. The village is surrounded by open agricultural land.

4.1.2 The River Pang enters the village on Water Street. The river flows south alongside Water Street and behind the houses on Church Street, before crossing Church Street and flowing to the south of the village. The river discharges to an existing pond before flowing south towards the M4.

4.1.3 The geology of the area is predominately Chalk with Alluvium along the line of the River Pang. Clay with Flints is present on higher ground to the east of the village.

4.1.4 In the winter of 2013-14 flooding in the village arose predominately from the River Pang, in which water levels were unseasonably high as a result of high groundwater levels. The high groundwater levels themselves also resulted in flooding of properties otherwise unaffected by the River Pang. A combination of high groundwater levels and surcharged outfalls to the River Pang also caused flooding issues with the sewage network.

4.1.5 Fourteen properties experienced flooding to internal areas of their property and/or within the external grounds of the property. Water Street, Church Street and Forge Hill also experienced flooding to varying depths. Drawing No. 70003227-04-101 identifies the flooded properties and the approximate flood extents and directions overland flows took through the village.

4.2 Flooding in Hampstead Norreys

4.2.1 Water levels in the River Pang were seen to be rising in the week commencing the 3rd February. The river caused flooding in the village from the 11th February. The village also suffered groundwater flooding at this time. Both the river level and groundwater level remained high for approximately 2 weeks.

Fluvial flooding

4.2.2 The river channel in Hampstead Norreys did not have the capacity to cope with the volume of water in the river. This issue was exacerbated by overland flow (resulting from high groundwater levels) following the route of the River Pang as the topographic low route through the village.

4.2.3 Waterside House suffered flooding to a depth of approximately 200mm to internal areas as a result of the River Pang spilling out of bank in this area. It is thought the river came out of bank due to incapacity in the channel.

4.2.4 Water from the river flooded the garden of Merrydown. The residents of Merrydown constructed a make-shift flood defence using railway sleepers to prevent water from entering their property. It is thought that at its highest point the water level would have resulted in internal flooding of this property if this defence had not been present.

4.2.5 Water Street was flooded to a depth of approximately 200mm as a result of the river spilling out of the channel. Water Street was formally closed on request of the residents due to the wash from passing vehicles exacerbating the problems in flooded properties.

4.2.6 In an effort to reduce the level of the River Pang, a diversion channel was dug by West Berkshire Council in the field to the east of Water Street. The channel took water from the River Pang to the north of the village and directed it across the field. The channel was not dug all the way back to the River Pang, instead the water was left to find its own path (overland) back to the river. This channel resulted in the water level in Water Street receding significantly.

4.2.7 Downstream of the point where the flows diverted from the River Pang re-entered the main channel, the Church Street bridge did not have sufficient capacity to deal with the volume of water. This resulted in water pooling in the field north of Church Street before it re-entered the river channel.

4.2.8 Further downstream the lack of capacity beneath the bridge resulted in water spilling out of bank and flooding the garden of Well House to the west of the bridge and the White Hart pub garden and car park. Both gardens were flooded to a depth of approximately 300mm.

4.2.9 Approximately half the width of Church Street was flooded from a highway drain surcharging at the point where Church Street crosses the River Pang.

4.2.10 1 Church Street suffered flooding from the river in the garden and garage to a depth of approximately 100mm. This property did not suffer internal flooding.

4.2.11 White Hart House experienced external flooding from the river in the rear garden. This property pumped water for approximately two weeks in the middle of February, when the water level was at its highest, to try and prevent internal flooding. It is thought White Hart House did not experience internal flooding as a result of this pumping.

4.2.12 Both Water Street and Church Street suffered damage to the road surface as a result of the flood water on the carriageways.

4.2.13 The properties on Forge Hill are located at a higher level than the River Pang and were not affected.

4.2.14 South of Church Street, the River Pang flowed in bank to a permanent informal pond, before continuing south.

Groundwater flooding

4.2.15 Four cottages in Water Street suffered flooding to internal areas of the properties from groundwater; 1 Frogmore Cottages, 3 Frogmore Cottages, 2 Railway Cottages and 4 Railway Cottages.

4.2.16 In 1 Frogmore Cottages groundwater emerged through the floorboards and flooded the property to a depth of approximately 100mm. For the last 2 or 3 years, when groundwater levels are high, a spring emerges in the driveway of 3 Frogmore Cottages. This spring resulted in internal flooding of the property to an approximate depth of 100mm. Both 1 and 3 Frogmore Cottages pumped water from the properties in an effort to reduce the levels. Both cottages were still pumping in early May.

4.2.17 Information on the characteristics and levels of the groundwater flooding in the two Railway Cottages was unknown at the time of writing this report.

4.2.18 Three further properties in Water Street experienced external groundwater flooding; 2 Water Street, Scottalls End and Myrtle Cottage. At its deepest the flood water in the gardens of these properties was approximately 200mm.

4.2.19 The channel side slopes along the length of the River Pang are retained by concrete slabs above adjacent ground level, which prevent free drainage from the adjacent fields and gardens. Consequently, the water tends to infiltrate into the ground behind the concrete slabs and is not discharged via the channel.

Sewer flooding

4.2.20 High groundwater levels caused groundwater ingress in the sewer system, resulting in sewerage surcharging from manholes along Water Street. The sewer system primarily surcharged from the manhole at the junction of Water Street and The Close. Raw sewage material flowed across the carriageway and into the River Pang.

4.2.21 Raw sewage collected on the carriageway along Water Street and Church Street from the 11th February to the end of March. Thames Water undertook sporadic clearing and cleaning.

4.2.22 From the first week of April the Railway Cottages were unable to flush toilets due to the sewer system being inundated. These properties were still experiencing issue at least until mid-April.

4.3 West Berkshire Council Emergency Response

4.3.1 West Berkshire Council closed Water Street at the request of residents, as the wash from the water covering the carriageway was exacerbating flooding to their properties.

4.3.2 The Council also provided sandbags and portaloos to the village.

4.3.3 The Army helped move furniture and possessions in flooded properties.

4.4 Risk Management Authorities

4.4.1 In addition to West Berkshire Council, the following Risk Management Authorities have relevant, flood risk management functions in Hampstead Norreys:

- Environment Agency
- Thames Water

Environment Agency

4.4.2 Residents struggled to contact appropriate representatives from the Environment Agency during the event and found that the information provided by the flood supportline was inconsistent and out of date.

4.4.3 The Environment Agency issued a fluvial flood alert for the River Pang valley from East Ilsley to Pangbourne on the 23rd December 2013.

4.4.4 Villagers did not receive the flood alert from the Environment Agency, despite being signed up to the alert service.

4.4.5 The Environment Agency did not issue a groundwater flood alert for Hampstead Norreys.

4.4.6 The engineers on the ground were found to be knowledgeable, but this knowledge was not made available more widely via the Environment Agency's website or flood supportline.

4.4.7 West Berkshire Council has not been aware of any further action taken by the Environment Agency at the time of writing this report.

Thames Water

4.4.8 Thames Water was slow to respond to requests for help from the village.

4.4.9 Representatives from Thames Water were present in the village during the event.

4.4.10 Thames Water undertook sporadic clearing and cleaning of areas of raw sewage. These actions were not communicated with the Parish Council or residents and it is not known how regularly clearing occurred.

4.4.11 West Berkshire Council has not been aware of any further action taken by Thames Water at the time of writing this report.

4.5 Recommendations

4.5.1 In order to reduce the extent of flooding in Hampstead Norreys the following measures should be considered:

Fluvial

Maintenance

4.5.2 The River Pang channel along Water Street requires regular maintenance to clear excess vegetation and any obstructions to the channel to ensure the full capacity of the channel is available during high flow events.

Major works

4.5.3 The temporary relief channel dug during the flood event should be permanently established for use during flood events. This relief channel would reduce the risk of flooding to properties in Water Street. A penstock could be used to regulate flows through the channel and ensure normal flows are maintained in the main river channel (to prevent adverse effects with respect to WFD requirements). The downstream impacts of formalising this channel need to be investigated to ensure it would not increase the flood risk to the properties on Church Street.

Other works

4.5.4 An investigation into the effects of the existing configuration and differing widths of the River Pang along Water Street and to the rear of Church Street should be undertaken to determine if these modifications are causing issues with the flow of water.

4.5.5 The effects of increasing the capacity beneath the Church Street bridge should be investigated to determine whether this is a viable solution to reduce flood risk to properties upstream. The downstream effect of this increase in capacity must be considered to ensure it would not increase the flood risk elsewhere.

Groundwater

Minor works

4.5.6 The concrete slabs which line the banks of the River Pang along Water Street need to be replaced to allow water from the adjacent fields and gardens to flow into the channel.

Sewer Network

Major works

4.5.7 It is recommended that Thames Water look at undertaking repairs and upgrading works to the sewer system in the village to prevent groundwater ingress. These works will help reduce the risk of sewer flooding.

5 Lambourn

5.1 Introduction

5.1.1 Lambourn Parish is situated in the north-west of West Berkshire, partly on the Berkshire Downs, next to the Parish of East Garston. The M4 motorway runs through the southern section of the Parish. Lambourn village is the main centre of population, situated at the centre of the parish.

5.1.2 The River Lambourn rises in Lynch Wood, to the east of Upper Lambourn, and is fed from a number of sources in the surrounding area, west of the village. The River Lambourn then flows south-east through the Parish, passing through the centre of the villages of Lambourn and Eastbury.

5.1.3 In the winter of 2013-14 three distinct areas within the Parish were affected by flooding: Upper Lambourn, Lambourn and Eastbury.

5.1.4 Upper Lambourn experienced flooding as a result of high groundwater levels and consequent overland flow paths that originated to the west of the village. Eight properties are known to have suffered flooding within the village during the winter of 2013-14.

5.1.5 Lambourn experienced flooding as a result of high groundwater and river levels. The high groundwater and river levels caused significant surface water runoff and inundation of the sewer system. Eight properties experienced flooding to internal areas of their property, with an additional five suffering external flooding in Lambourn.

5.1.6 Within Eastbury the River Lambourn burst its banks to the north of the village and affected a number of properties in the village.

5.1.7 Drawing N^{o}s. 70003227/05/101, 06/102 and 07/103 identify the flooded properties, the approximate flood extents and the directions overland flows took through the villages.

5.2 Upper Lambourn

5.2.1 Upper Lambourn is situated upstream of the recognised start of the River Lambourn, in the north-west corner of the parish.

5.2.2 Flooding occurred in 2 main areas of the village; along Maddle Road and along the High Street. These two areas of flooding largely resulted from two overland flow paths, both of which originated from high groundwater levels. One overland flow path was associated with Maddle Road from the north, the other with the B4000 from the west.

5.2.3 The overland flow route affecting Maddle Road originated from a groundwater spring south of Whitcombe House Stables. This water flowed in the fields alongside Maddle Road. The fields are predominantly situated at a lower level than the road, which served to keep water off the highway to the north of the village. Water flowed out of the fields onto the highway opposite Kingsdown Stables towards Newlands Stables. This overland flow route combined with groundwater to cause internal flooding to Newlands Stables and the indoor exercise ring at Kingsdown Stables, and externally flood land associated with Kingsdown and at Sovereign Chase yard.

5.2.4 A drainage ditch is present alongside Maddle Road by Kingsdown; however this ditch was of insufficient capacity to deal with the volume of runoff on the highway. Water was pumped from Newlands Stables to the High Street in an effort to reduce the water level around the property. This pumping only had a localised affect.

5.2.5 South-east of Newlands Stables, runoff flowed along the highway onto the High Street. A significant quantity of water collected on the High Street highway west of the junction with Maddle Road.

5.2.6 The groundwater fed overland flow path which affected the western end of the High Street, flowed alongside the B4000. This water first emerged in a field between Fognam Farm and the Thames Water Ashdown pumping station. As groundwater levels rose, water emerged further west of this field, from a disused well located beyond the district boundary. Water from the well flowed east to join the existing overland flow path.

5.2.7 Water flowed in the fields to the north of the B4000 and collected in the field by Park Farm Drive to a depth of approximately 1m. This water overflowed over the drive into the field, north of the B4000. This overland flow route continued east, before collecting again to a depth of approximately 1m in the field west of the junction of the B4000 and the High Street. This water then continued eastwards before flowing over the embankment onto the west end of the High Street.

5.2.8 Groundwater also emerged in a field to the east of Fognam Farm, south of the B4000. This water flowed north, overflowing onto the B4000.

5.2.9 An area of overland flow and surface runoff collected at the junction of the B4000 and the High Street.

5.2.10 In addition to the overland flow, sewage surcharged from a number of the foul manholes on the High Street, contributing to the flooding.

5.2.11 Two properties suffered external flooding as a result of the flood water on the High Street: Tumbleweed Cottage and Seven Springs.

5.2.12 Further along the High Street three further properties experienced flooding to internal areas due to high groundwater levels: Lynchetts, Cruck Cottage and Sarcens. The residents of Sarcens had to move out of the property as a result of the damage.

5.2.13 Chestnut Cottage and Frenchmans Yard suffered external flooding as a result of high groundwater levels.

5.2.14 Raw sewage collected on the High Street in several locations.

5.2.15 The Parish Council has received a number of reports of children with stomach upsets during the flood event.

5.3 Lambourn

5.3.1 Flooding in Lambourn was concentrated in three main areas: along B4001 Wantage Road to the north-east of Lambourn; at the junction of Mill Lane and Newbury Street, where the River Lambourn flows beneath Newbury Street and Windsor House Paddock at Crowle Road.

5.3.2 In early February groundwater emerged in the field to the north of Seven Barrows House in Lambourn Downs (to the north of Lambourn) and flowed south. Water collected at a number of points in the fields alongside the road through Lambourn Downs. A combination of groundwater rising up to fill the highway ditches, heavy rainfall and overland flow from the surrounding fields resulted in water flowing onto and off of the highway at various points between Lambourn Downs and Lambourn.

5.3.3 The majority of the water was channelled south towards Lambourn in the roadside ditches either side of the B4001 Wantage Road. The volume of water resulted in inundation of the ditches, resulting in water spilling onto the highway in several locations.

5.3.4 At the northern extent of the village a large volume of water collected in the recreation area immediately north of North Farm Close. A temporary drainage channel was dug in the south-west corner of the field to allow the water to flow into the highway drains and prevent properties to the south

from flooding. It is not known whether these properties would have flooded if the channel had not been dug.

5.3.5 The roadside ditch on the west of the Wantage Road ends at North Farm Close, whilst the ditch on the east flows into culvert beneath North Farm Close. It is thought this culvert flows east beneath into the surface water drainage system. During the flood event the culvert appeared to be flowing at full capacity. The water levels were observed to be above the soffit but not spilling over the top of the structure.

5.3.6 Rising groundwater resulted in an area of flooding on Sheepdrove Road. This localised highway flooding caused internal damage to property numbers 6 and 8 Sheepdrove Road.

5.3.7 Further south surface water runoff collected in the low point at the corner of Millfield. Number 8 Millfield experienced external flooding as a result of the water on the carriageway. The surface water drainage system which serves Millfield drains via a pipe which outfalls into the River Lambourn to the south-west of Millfield. This pipe is approximately 600mm in diameter at its outfall and has a grill at the outfall as a safety precaution. During the flood event this grill was found to be blocked. The grill was forced open by a local resident, resulting in the water level in Millfield dropping significantly.

5.3.8 Following the clearing of the grill surface water runoff which had collected on Oxford Street, to the south of Mill Lane, also drained away. It is unknown how this area is connected to the Millfield outfall.

5.3.9 Further south along Oxford Street, N^{o}s 19, 20, 21 and 23 experienced external flooding from groundwater.

5.3.10 On the corner of the Broadway and Oxford Street, Ladbrokes and N^{o}. 1 the Broadway suffered internal flooding from the River Lambourn, which flows to the rear of the properties in an open channel. This flood water also contained sewage water, thought to be from surcharged sewers due to inundation as a result of the high groundwater levels.

5.3.11 Sewage water was seen surcharging from the foul manhole outside N^{o}. 40 Newbury Street , close to where the River Lambourn flows in culvert beneath Newbury Street. The proximity of the manhole to the river means the majority of sewage water discharged into the watercourse. Prior to discharging to the River Lambourn, a significant volume of sewage water collected on Newbury Street, between the junctions with Mill Lane and Aintree, resulting in the closure of the highway. Four properties along Newbury Street were flooded internally as a result of the sewage water on the carriageway; N^{o}s. 40, 49, 51 and 53 Newbury Street. N^{o}. 40 Newbury Street also experienced flooding to internal areas of the property due to rising groundwater.

5.3.12 The third area of Lambourn to be affected during the winter 2013-14 flood event was Windsor House Paddock, situated between Baydon Road and Crowle Road. On the 14th and 15th February a significant volume of water collected in the paddock as a result of the high groundwater levels. The potential breach points along the paddock boundary (the access gates) were sandbagged and a small pump was installed in the north-east area of the paddock in an effort to prevent the water breaching. The pump discharged to the surface water drainage system on Crowle Road. The water level remained high for approximately eight weeks. The level subsided as the groundwater levels in the area began to fall, taking another two weeks for the water in the field to drain away completely.

5.3.13 Despite the sandbags, water flowed north from the field across Crowle Road and then between Crowle House and Windsor House. This overland flow then flowed to the north-east, before flowing north along the boundaries of the properties in Glen Court. The water pooled at the end of Old Coach Works, before discharging to the north-west via a drain near St John's Chapel.

5.4 Eastbury

5.4.1 The village of Eastbury suffered flooding in the middle of February as a result of the River Lambourn bursting its banks in two locations; Back Street and Newbury Road.

5.4.2 The river level was seen to be rising from the start of January, and overtopped the banks at the beginning of February.

5.4.3 Sections of the River Lambourn are heavily silted in Eastbury, with the amount of silt estimated to be between 600mm and 900mm in places. The volume of silt in the channel reduces the capacity of the river and results in the river rising to the same level as Back Street during times of high flow. Consequently, the river flows onto the highway in a number of locations along Back Street and Newbury Street.

5.4.4 Flood water was still present on Back Street in early May due to the level of the river.

5.4.5 The siltation of the river beneath Bottom Bridge resulted in the river flowing over the top of the bridge and pooling at the low point on the highway at the junction with Straight Lane.

5.4.6 In an effort to reduce the flooding in the village, West Berkshire Council provided pumps. One of the pumps was installed near to Bottom Bridge, which pumped water beyond the village, discharging back into the River Lambourn by Rose Farm. It is thought this pumping saved approximately 10 houses downstream of Bottom Bridge from flooding.

Thames Water tankered from the surface water drainage system at the junction of Straight Lane and Newbury Street and from the Eastbury pumping station. Tankering was 24/7 for approximately 2 weeks.

5.4.7 No additional information was provided regarding the pumps installed in the village

5.4.8 The number of properties which experienced flooding in Eastbury, and the extent to which any properties flooded, has not been provided for this report.

5.5 West Berkshire Council Emergency Response

Upper Lambourn

5.5.1 West Berkshire Council provided sandbags to Chestnut Cottage and Cruck Cottage.

5.5.2 The Council provided flood warning signs for the B4000.

Lambourn

5.5.3 As the Highway Authority West Berkshire Council closed the Wantage Road, Oxford Street and Newbury Street as a result of flood water on the carriageway.

5.5.4 West Berkshire Council provided sandbags to the village.

5.5.5 The Army installed sandbags at the potential breach locations along the boundary of Windsor House Paddock.

Eastbury

5.5.6 West Berkshire Council provided pumps to Eastbury in the first week of February.

5.5.7 Sandbags were also provided to residents in early February. The Army was deployed to help distribute the sandbags.

5.5.8 Newbury Road was closed by the Council on the 8th February at the request of residents in the village due to bow waves from passing vehicles exacerbating the flooding of properties.

5.6 Risk Management Authorities

5.6.1 In addition to West Berkshire Council, the following Risk Management Authorities have relevant, flood risk management functions in the parish:

- Environment Agency
- Thames Water

Upper Lambourn

Environment Agency

5.6.2 A Fluvial Flood Alert was issued along the length of the River Lambourn, including tributaries, from Upper Lambourn to Newbury on the 7th January. This was followed by a Fluvial Flood Warning for the River Lambourn from Upper Lambourn to Great Shefford on the 6th February. This warning was removed on the 22nd February.

5.6.3 A Groundwater Flood Alert was issued to the Lambourn valley on the 9th January.

5.6.4 West Berkshire Council has not been made aware of any further action taken by the Environment Agency at the time of writing this report.

Thames Water

5.6.5 Thames Water undertook works to ensure their pumps continued to function effectively and tankered water from the sewer system in the village on a number of occasions.

5.6.6 Thames Water tested the quality of the water discharging from the sewer system.

5.6.7 Areas affected by sewage water were cleaned and disinfected. The Parish Council understand that Thames Water was undertaking clean-up works on an almost daily basis.

5.6.8 'Remedial works' are planned for both the sewer system in Upper Lambourn and Lambourn. At past meetings with the Parish Council Thames Water has defined 'remedial work' as works to line the system. The extent of these works is unknown. It was anticipated this work would be undertaken in the winter of 2013-14, however flooding prevented this. It is understood these works to re-line the sewers have now commenced in Upper Lambourn.

5.6.9 West Berkshire Council has not been made aware of any further action taken by Thames Water at the time of writing this report.

Lambourn

Environment Agency

5.6.10 A Fluvial Flood Alert was issued along the length of the River Lambourn, including tributaries, from Upper Lambourn to Newbury on the 7th January. This was followed by a Fluvial Flood Warning for the River Lambourn from Upper Lambourn to Great Shefford on the 6th February. This warning was removed on 22nd February.

5.6.11 A Groundwater Flood Alert was issued to the Lambourn valley on the 9th January.

5.6.12 The Environment Agency has informed Lambourn Parish Council that they will clear and clean the culvert beneath Newbury Street, near the junction with Mill Lane.

5.6.13 West Berkshire Council has not been made aware of any further action taken by the Environment Agency at the time of writing this report.

Thames Water

5.6.14 Thames Water tested the quality of the water discharging from the sewer system.

5.6.15 Thames Water tankered from Aintree twice a day from the middle of February for approximately two weeks.

5.6.16 Areas affected by sewage water were cleaned and disinfected. The Parish Council understand that Thames Water was undertaking clean-up works on an almost daily basis. The sewer system stopped surcharging at Newbury Street in mid-April. Thames Water repaired the manhole outside N^{o}.40 during the week before Easter to enable the road to be re-opened.

5.6.17 West Berkshire Council has not been made aware of any further action taken by Thames Water.

Eastbury

Environment Agency

5.6.18 A Fluvial Flood Alert was issued along the length of the River Lambourn, including tributaries, from Upper Lambourn to Newbury on the 7th January. This was followed by a Fluvial Flood Warning for the River Lambourn from Upper Lambourn to Great Shefford on the 6th February. This warning was removed on 22nd February.

5.6.19 A Groundwater Flood Alert was issued to the Lambourn valley on the 9th January.

5.6.20 West Berkshire Council has not been made aware of any further action taken by the Environment Agency at the time of writing this report.

Thames Water

5.6.21 Thames Water officers were present in the village during the event to provide support and assistance.

5.6.22 Thames Water tankered from the surface water drainage system at the eastern end of the village and from the Eastbury pumping station. Tankering was 24/7 for approximately 2 weeks.

Other authorities

West Berkshire Fire Brigade and Police

5.6.23 Both the fire brigade and police force supported the village during the flood event. The frequent police patrols through the village reassured owners of properties which were empty as a result of flooding.

5.7 Recommendations

5.7.1 In order to reduce the extent of flooding in Lambourn Parish the following measures should be considered:

Upper Lambourn

Major Works

5.7.2 An investigation should be undertaken to determine the feasibility and benefit of providing attenuation areas to the west of the village, to store water flowing from the north-west. Attenuating the water in this location would reduce the volume of water flowing into Upper Lambourn and in turn decrease the risk of flooding.

Lambourn

Maintenance

5.7.3 The Millfield pipe outfall grill should be regularly cleared and maintained to ensure that this outfall remains safe and that water is able to flow freely. An investigation into the types of material causing the grill to become blocked would indicate whether additional grills upstream or at additional points along the length of the pipe would be beneficial.

Minor Works

5.7.4 A new grill over the Millfield pipe outfall is required to allow maintenance to be safely and regularly undertaken, ensuring this grill does not become blocked. This would help ensure that highway runoff does not collect in Millfield or on Oxford Street, to the south of Mill Lane.

Eastbury

Maintenance

5.7.5 The channel of the River Lambourn in the village needs de-silting regularly to ensure the river is able to contain the water within its banks during times of high flow. This will ensure water does not spill onto Back Street and Newbury Street, helping reduce the flood risk to properties in the village.

Major Works

5.7.6 A flood storage scheme for Eastbury has received funding from the Environment Agency and is anticipated to be delivered in partnership with West Berkshire Council and the residents in the village in summer 2014. The scheme will serve to attenuate flash flooding associated with a significant rainfall event ensuring high volumes of water are not channelled into the village in a relatively quick time period. This scheme will serve to reduce the flood risk to the village associated with surface water runoff and flash floods. It will not reduce the risk of groundwater flooding or fluvial flooding as a result of high groundwater levels.

5.7.7 Works could be undertaken to raise the level of the River Lambourn banks at points in the village, especially in those locations where the river typically breaches. These works would help keep the river in channel through the village and reduce the risk of flooding to properties alongside the watercourse. These works would be subject to the approval of the Environment Agency and may not be possible due to the River Lambourn being classified as a SSSI along its entire course.

6 East Garston

6.1 Introduction

6.1.1 The Parish of East Garston is located towards the north-west of the County, bordered by Lambourn to the west and Great Shefford and Fawley to the east. The village of East Garston is situated on the River Lambourn, which runs west to east through the centre of the parish. The river runs through the centre of the village between the two main roads; Back Street and Front Street.

6.1.2 In the winter of 2013-14 the village suffered flooding as a result of high groundwater levels feeding high water levels in the River Lambourn. The high groundwater levels in the area also resulted in groundwater ingress in the sewer system, causing the system to surcharge and cause flooding in the village. The majority of the properties affected in the village suffered as a result of groundwater flooding.

6.1.3 Six properties suffered flooding to internal areas of their property with an additional eleven suffering external and/or cellar flooding. Front Street, Back Street, School Lane and Station Road were flooded in several locations. Drawing N^{o}s. 70003227/06/101 to 103 identify the flooded properties, the approximate flood extents and the directions the overland flows took through the village.

6.2 Flooding in East Garston

Groundwater Flooding

6.2.1 Groundwater levels were observed to be rising in the vicinity of the village through January, with the first incidences of groundwater flooding occurring on the 5th February, affecting Old Cottage and Willow Brook.

6.2.2 The village Flood Warden monitors the groundwater levels in the village and the levels were observed to be rising very rapidly in the few days prior to the 5th February. This allowed the village to have a few days warning prior to the flooding occurring.

6.2.3 Old Cottage experienced flooding in three rooms on the ground floor of the property. The water depth ranged from 150mm to 200mm. The property owner installed a pump in the property on the 5th February. The pump was working continuously for 5 weeks in an effort to reduce the water level. The pump discharged 4.5l/s and lowered the water depth to between 100mm and 120mm.

6.2.4 Willow Brook experienced flooding to a number of the ground floor rooms to a depth of approximately 100mm.

6.2.5 In the week following the 5th February a further 10 properties suffered either internal, cellar or external flooding as a result of the rising groundwater levels.

6.2.6 Much More, Lone Barn and Cherry Cottage suffered internal groundwater flooding to the ground floor. Groundwater rose up through the floorboards in all of the properties, flooding them to a depth of 25mm, 125mm and 50mm respectively. All three properties installed pumps to reduce the level of flood water. These pumps operated continuously for approximately 5 to 6 weeks. Much More pumped from a well, located approximately 2m from the main property building.

6.2.7 Green Gates also suffered internal flooding from groundwater. A groundwater spring is located in the garden of the property. This spring started discharging water from the 5th February. The water from the spring flowed through the garden and under the door of the property as opposed to rising through the floorboards.

6.2.8 Lambs Cottage suffered flooding to internal areas of the property. Flood water came through the wattle and daub wall and it was initially unclear as to whether the water was fluvial or groundwater. It was

concluded that the flooding was groundwater as water was successfully drained from the property by digging a channel from the property to the river.

6.2.9 Brooklands, East Garston House, Bay Tree, Greensleeves, the Old Stables, Pleasance Cottage and Corn Baggers experienced external flooding in their gardens as a result of rising groundwater. Brooklands, East Garston House and Pleasance Cottage all pumped water from the gardens to prevent internal flooding.

6.2.10 Highbury experienced cellar flooding but did not pump as the risk to internal areas of the property was not perceived to be significant.

6.2.11 Groundwater also emerged through the highway along Front Street and the southern part of School Lane, significantly damaging the road surface. It is thought a line of springs lies beneath School Lane. Neither road was officially closed, but the damage made the road impassable in a number of places.

6.2.12 The highway gully at the junction of Front Street and School Lane, which flows into the River Lambourn, became blocked during the flood event. The blockage was thought to be caused by tarmac from the damaged road surface. The groundwater surcharging through the road surface was therefore unable to drain via this gulley into the river, resulting in the junction flooding. The gulley was also unable to discharge into the river as the river level was above the outfall of the pipe.

Sewer flooding

6.2.13 As a result of the high groundwater levels in the village, the foul sewer system experienced groundwater ingress, leading to a lack of capacity in the network and sewage back-up. This issue was confined to the western half of the village, from the junction of School Lane and Front Street.

6.2.14 Lambs Cottage, in addition to experiencing groundwater flooding, suffered flooding to internal areas of the property as a result of the sewer system surcharging.

6.2.15 Corn Baggers, Manor Cottage and Willow Brook all had sewage water flood external areas of their property.

6.2.16 Sewage water surcharged from the manhole in front of N^{o}. 2 Station Road, flooding the area in front of the property. This water did not cause internal flooding to any properties in Station Road, however all five properties experienced problems using toilets due to the back-up of sewage water in the system.

6.2.17 In an effort to increase the capacity in the sewer network, Thames Water discharged foul water into the River Lambourn from the pumping station, located at the eastern end of the village. Water was discharged continuously from the 8th January and was still being discharged to the river in late April. Thames Water monitored the content and the Environment Agency approved the discharge to the river.

6.2.18 Thames Water also tankered water from the pumping station, at the request of East Garston Parish Council, to try and further alleviate the capacity issues in the network. Tankering was undertaken from the 10th February until the end of April.

6.2.19 Both discharging to the river and tankering helped to lower the levels in the sewer and consequently reduced the level of sewer flooding in the village.

Fluvial flooding

6.2.20 The River Lambourn breached its banks at Forge Bridge on the 12th February due to a lack of capacity beneath the bridge. Water from the river flowed onto Front Street and Station Road. The footbridges in front of the Station Road cottages were all flooded due to the water backing-up in the river.

6.2.21 School Lane bridge was at capacity on the 12th February, but the water did not come out of bank or overtop the bridge at this point in the village.

6.2.22 The water level subsided overnight on the 12th February, but rose back to approximately the same level on the 14th February.

6.2.23 Anecdotal evidence from local residents indicated the River Lambourn has not breached its banks in East Garston in the last 25 years.

6.2.24 No properties in East Garston experienced internal flooding from fluvial flood water.

6.2.25 Manor Cottage came close to being flooded internally from fluvial flood water; however the flooding remained in the garden of the property.

6.2.26 The informal flood storage area to the west of the village held back some of the water flowing from further west in the Lambourn valley, helping to reduce the extent of fluvial flooding in East Garston.

6.3 West Berkshire Council Emergency Response

6.3.1 West Berkshire Council provided sandbags to the village.

6.3.2 Four portaloos were provided to the residents of Station Road cottages.

6.3.3 East Garston did not receive any pumps from external authorities; all pumps used in the village were privately owned or rented.

6.4 Risk Management Authorities

6.4.1 In addition to West Berkshire Council, the following Risk Management Authorities have relevant, flood risk management functions in West Ilsley:

- Environment Agency
- Thames Water

Environment Agency

6.4.2 A fluvial Flood Alert was issued for the River Lambourn from Upper Lambourn to Newbury on the 7th January. This was followed by a Flood Warning for the River Lambourn from Upper Lambourn to Great Shefford on the 6th February. The Flood Warning was removed on the 22nd February.

6.4.3 A Groundwater Flood Alert was issued to the Lambourn valley on the 9th January.

6.4.4 A number of residents in the village reported that they were unable to register to receive flood alerts from the Environment Agency.

6.4.5 The Environment Agency website presented ambiguous information relating to the levels along the River Lambourn. The latest monthly groundwater levels report was not available on the Environment Agency's website. The groundwater alert did not appear in a search for East Garston, Lambourn or the village postcode on the Environment Agency website.

6.4.6 The Environment Agency conducted a house-to-house survey of the entire village to ensure all residents were coping following the flood event. The Parish Council were not informed of this survey and feedback was not sent to the Parish Council. The Parish Council were willing to assist those in need.

6.4.7 West Berkshire Council has not been made aware of any further action taken by the Environment Agency.

Thames Water

6.4.8 Residents who spoke with Thames Water during the flooding felt the response provided was poor and no action was taken by Thames Water as a result of the calls made.

6.4.9 The Parish Council liaised with Thames Water and organised for Thames Water to tanker water from the pumping station in the village. Thames Water began tankering from the pumping station on the 10th February; 12 hours after speaking with the Parish Council. Tankering continued until the end of April.

6.4.10 Thames Water undertook house-to-house visits of the properties affected by sewage water to check residents were coping.

6.4.11 It is believed by residents that Thames Water had not undertaken cleaning of areas affected by sewage flood water in the village.

6.4.12 Thames Water have committed to relining 2km of the sewer system in East Garston to help reduce the incidences of groundwater ingress into the network. The start date for this work is not known. The planned works are for the sewers lying beneath Front and Back Street.

6.4.13 West Berkshire Council has not been made aware of any further action taken by Thames Water.

Other authorities

Berkshire Fire and Rescue Service and West Berkshire Police

6.4.14 The Fire and Rescue Service and Police went door-to-door in the affected areas of the village to ensure the residents were coping following the flood event.

6.5 Recommendations

6.5.1 In order to reduce the risk of flooding in East Garston the following measures should be considered:

Maintenance

6.5.2 The river channel needs de-silting to ensure it is able to cope with the volume of water flowing in the watercourse during storm events. This is especially important beneath the two bridges to ensure the water does not come out of bank at these locations.

Minor Works

6.5.3 Chapel Cottage (N°. 1 Station Road) has made an application to the Environment Agency to raise the height of the wall outside the front of the property to 1m. This wall forms one of the banks of the River Lambourn. It is thought raising the wall will protect the property during times of high flow in the river channel. If the application is approved by the Environment Agency, it is recommended that this wall be raised along the full extent of this section of the river to protect the other four Station Road cottages.

6.5.4 For those properties affected by groundwater flooding, sumps or pumps should be installed to help alleviate the levels of groundwater flood water in and around these properties. Surveys should also be undertaken to determine if any additional property level protection measures would be of benefit to properties affected by groundwater flooding in the village.

Major Works

6.5.5 The informal flood storage area in the fields to the west of the village could be formalised and increased to provide a larger attenuation area during storm events. Once formalised this area should be Designated by West Berkshire Council and added to the West Berkshire Council Asset Register to ensure it is not modified in the future. Formalising this area would help reduce the risk of fluvial flooding to East Garston and help to regulate the river levels when groundwater levels are high, allowing residents to discharge groundwater from their homes to the river.

7 Great Shefford

Introduction

7.1.1 The Parish of Great Shefford is located to the north-west of West Berkshire, north of the M4. The River Lambourn flows north-west to south-east, while the A338 Wantage Road runs south-west to north-east, both through the centre of the parish.

7.1.2 The majority of the population resides in Great Shefford village, which is situated in the centre of the parish, around the crossing of the river and the road. The River Lambourn flows to the south of the village and is fed by the Great Shefford Stream, which joins the river downstream of the A338 crossing. The Great Shefford Stream flows north to south through the village, alongside the A338 Wantage Road. This watercourse flows from the northern edge of the parish, at Henley Farm, through to the River Lambourn and is classified as a Main River from Mount Pleasant to the River Lambourn. The watercourse is a chalk winterbourne and therefore responds to high groundwater conditions in the Lambourn valley.

7.1.3 The West Berkshire Groundwater Scheme (WBGWS) runs north-south alongside the A338 Wantage Road in Great Shefford, before discharging into the River Lambourn to the south-east of the village. The scheme comprises a network of groundwater abstraction boreholes and pipes feeding into a main carrier pipe. The scheme was constructed in the 1970s to extract water from the chalk aquifers in West Berkshire to supply water to areas of London during times of drought. The scheme is owned and operated by the Environment Agency for Thames Water, who pays the operating costs. The carrier pipe runs alongside the A338 Wantage Road in Great Shefford and has a diameter of 450mm at the northern end of the village increasing to 750mm in diameter at the southern end, by the petrol filling station.

7.1.4 The pipe can be accessed at the northern entrance to the village, immediately adjacent to the A338 Wantage Road and by the petrol station, opposite Miller's Field. A sluice near the petrol station was installed following the 2000/01 flood event, to enable the culvert to function as an overflow channel.

7.1.5 In the winter of 2013-14 the main cause of flooding was due to the Great Shefford Stream overtopping its bank. These high river levels resulted from high groundwater levels in the Lambourn Valley during the winter months. The high groundwater levels also caused a significant volume of surface water and overland flow in the village and surrounding area. This water contributed to the high flows in the stream and collected on areas of the highway. The water on the highway was unable to drain away in places, resulting in flooding to at least one property at the north end of the village.

7.1.6 Rising groundwater also caused flooding to older properties in the village, situated at a lower level. Both groundwater ingress in the foul sewage system and blockages in the network affected a number of properties towards the southern end of the village.

7.1.7 Sixteen properties suffered flooding to internal areas of the property with an additional twenty-one suffering external flooding. The majority of these properties are located on the A338 Wantage Road, which was also flooded in a number of places. Drawing Nos. 70003227/09/101 to 103 identify the flooded properties, the approximate flood extents and the directions overland flows took through the village.

Flooding in Great Shefford

7.1.8 Emerging groundwater in the upper reaches of the River Lambourn valley resulted in water flowing through the normally dry valley to the north, causing the Great Shefford Stream to flow to a much greater extent than normal. The properties at Henley Farm, Wessex Saw Mill and Trindledown Farm were all externally affected by this water. Flooding occurred on the minor roads to Fawley and Henley Farm, west of the A338 Wantage Road; the A338 Wantage Road at Trindledown Farm; and across Buckham Hill the road to Chaddleworth, east of the A338 Wantage Road.

7.1.9 North of the village the Great Shefford Stream flows to the east of the A338 Wantage Road before passing beneath the A338 Wantage Road in culvert at the northern entrance to the village. The stream broke its banks at the entrance to this culvert at the beginning of February, with the channel being unable to retain the stream until the 26th February. The stream flowed south along the A338 Wantage Road, combining with surface water runoff to flood the road to a depth of approximately 600mm. The road was closed for approximately 4 days from the 12th February. The stream came out of bank at this point again between the 2nd and the 9th March as a result of further heavy rainfall.

7.1.10 An access to the WBGWS is located just downstream of the A338 Wantage Road culvert. Three pumps were installed at this point by West Berkshire Council to pump water from the stream into the WBGWS pipe. Pumping began in early February and continued until the 4th April.

7.1.11 To the south of the culvert crossing under the A338 Wantage Road, the Great Shefford Stream flows through the rear gardens of a number of properties. The stream is culverted in places, particularly between the properties of Wayside and Beam End Cottage. During the winter 2013-14 event the culverts were under capacity, causing water to flow above the culverted sections through residential gardens.

7.1.12 Following the 2000/01 flood event an overflow channel was constructed in the area north of Blakeney Fields. During times of high flow water from the stream flows into this overflow channel via two 375mm diameter pipes. Water was flowing in the channel during the 2013-14 event, but it did not reach capacity. However, the overflow channel behind Tofrek did not prevent water in the main channel causing flooding to properties. The overflow channel re-joins the main stream in the rear garden of Miami.

7.1.13 The most northerly property along the A338 Wantage Road to experience flooding was Bomar, which was affected by the Great Shefford Stream overtopping its bank onto the A338 and at the rear of the property. Both flows caused the property to flood internally to a depth of approximately 50mm. Sandbags later prevented further water on the road from entering internal areas of the property, but not the garage, which could not be adequately sandbagged.

7.1.14 Next door to Bomar, a sandbag channel was constructed between Wayside and Tofrek, which prevented runoff from the road flooding internal areas of Wayside. Wayside was unaffected by water in the Great Shefford Stream as the watercourse flows into culvert beneath the garden.

7.1.15 Tofrek suffered internal flooding in two rooms to a depth of 15mm as a result of rising groundwater. The property owner dug a relief channel around the front of the property and installed a pump to protect the property from water flowing from the road. The driveway was also used to channel water from the road to the rear of the property. Pumping kept the external water depth at approximately 25mm. This depth increased to 125mm when pumping ceased. Water being channelled from the road flooded the rear garden, but this water did not affect internal areas of the house.

7.1.16 A sandbag channel was also constructed between Cobwebs and Little Wolagnub. This channel, along with sandbagging in front of the property, prevented Cobwebs from experiencing internal flooding. Flood water flowed through the rear garden, following the line of the culvert. During the peak of the event, this water was flowing fast enough to dismantle fence panels. The entire garden was flooded

up to the property walls to a depth of 50mm; the damp course of the property is 150mm above external ground levels.

7.1.17 Little Wolagnub and Richfield were prevented from internal flooding by sandbagging. The flood water in the gardens of these properties was approximately 450mm deep during the peak of the event and was observed to be flowing quickly.

7.1.18 The surface water manhole on the A338 Wantage Road outside Richfield was opened up and drained away a significant volume of floodwater. This manhole is thought to have helped save Wayside, Cobwebs, Wolagnub and Richfield from flooding internally.

7.1.19 The Great Shefford Stream comes out of culvert at Beam End Cottage. Water flowed from the garden of Richfield into the open watercourse. The majority of the garden of Beam End Cottage was not flooded. Sandbagging and plastic sheeting prevented water from the road entering the property. However, the cottage experienced extensive groundwater flooding to internal areas on the 12th February.

7.1.20 The flood water on the A338 Wantage Road was channelled into the highway gulley outside Miami. The rise in the road level south of here meant surface water runoff did not extend past this point.

7.1.21 Miami, Tarn Hows, Meadowside, Hythe Cottage, Glen Cottage, Braemar, Linden and Downside only experienced external flooding to narrow, lower lying sections of the gardens, either side of the watercourse.

7.1.22 South of Miami the stream remained in channel, flowing into the flood compensation basin at Spring Meadows. The stream flows in culvert beneath Spring Meadows. South of the culvert the stream came out of bank, flowing into the gardens of Linden and Downside. A large volume of water collected in the southern flood compensation basin, however the basin did not prevent water flooding gardens to the east. Water coming out of bank to the south of the culvert, but not to the north, suggests the balancing between the two flood compensation basins is not right.

7.1.23 The majority of the rear garden of Grasmere was flooded due to the stream backing up as a result of restrictions further south in the channel.

7.1.24 Montbeck experienced internal flooding from groundwater rising through the floor of the property on the 12th February. The property was also flooded from the Great Shefford Stream coming out of bank. Flood water from the stream surrounded the property, resulting in water flowing into the property in a number of locations.

7.1.25 Ashgill and Cavendish suffered external flooding from the Great Shefford Stream coming out of bank. Water was heard running beneath the floorboards in Cavendish. It is thought if it had not been for the efforts of the property owner in constructing sandbag defences, digging a moat and installing a pump then the property would have flooded internally.

7.1.26 Cavendish was also at risk of flooding from surface water runoff which collected on the A338 Wantage Road in this location. This flood water was thought to have resulted from a blocked or inundated highway drain.

7.1.27 Little Croft flooded internally as a result of both the Great Shefford Stream coming out of bank and groundwater rising up through the floorboards. This property was one of the first to flood in the village in early February.

7.1.28 Both Winterbourne and Holmleigh experienced external flooding in the rear gardens from the Great Shefford Stream.

7.1.29 Long Thatch and Thatched Corner Cottage experienced internal flooding from the Great Shefford Stream and groundwater rising through the floorboards. Long Thatch installed 3 pumps on the 5th

February in a channel dug at the rear of the property. These pumps were successful in keeping groundwater out of internal areas of the property until a power cut on the 14th February.

7.1.30 Montbeck, Cavendish, Ashgill, Long Thatch and the Village Shop & Post Office were unable to flush toilets due to a lack of capacity in the sewage system.

7.1.31 N°.s 1, 3, 5 and 7 the Mead experienced external sewage flooding from surcharging foul manholes. Foul water discharged from the sewers throughout March, flooding gardens to a depth of up to 300mm. Residents repeatedly contacted Thames Water to request assistance. Thames Water was unwilling to investigate as it was believed groundwater ingress had inundated the network. Thames Water began investigations at the end of March, following a news bulletin about flooding in the village featuring on South Today on the 23rd March. Thames Water spent a week jetting, tankering and clearing the drainage network whilst flood levels were still high. These works alleviated the flooding in the Mead.

7.1.32 The Village Shop & Post Office was at risk of flooding from the Great Shefford Stream and the surcharging manholes on the Mead, but in the end did not flood internally. A portaloo was provided as it was not possible to flush the toilets.

7.1.33 Rowan House pumped groundwater from the garden to the stream. This pumping was thought to have prevented the property flooding internally. The garage of the property was flooded.

7.1.34 Old Bakery suffered internal flooding as a result of the Great Shefford Stream flowing out of bank on the 9th February. The flood water flowed across the garden to the road. The Great Shefford Stream narrows through the garden of this property, increasing the volume of water flowing out of the channel. The property is served by a sceptic tank and it is understood that a combination of fluvial and foul water flooded internal areas of the property.

7.1.35 Hillview suffered flooding to internal areas of the property on the 11th February as a result of rising groundwater and the Great Shefford Stream backing up in Brookside.

7.1.36 Brookside experienced flooding to internal areas of the property due to the Great Shefford Stream overtopping. The watercourse flows to the west of the property and is contained with a narrow channel (the stream is nearly twice as wide in Old Bakery, next door, than Brookside). On the 3rd February water flowed out of the channel and along the driveway to a depth of 600mm. Two channels were dug at the entrance to the driveway to divert the water back into the stream and reduce the volume flowing onto the A338 Wantage Road. The Great Shefford Stream is culverted beneath the garage of the property. The stream came up through the garage floor and flowed through the structure at a significant speed. Flood water entered the property via the doorways and rose up through the floor. During the peak of the event the property was flooded to a depth of 150mm. Water entered the property on the 11th February and remained in the house for 5 weeks. Externally, the water was present for approximately 2 months. The property was still drying out in late May and the owners do not anticipate being able to move back into the property until late autumn 2014. The property owners wish to widen the stream through the property, but ownership issues are stalling the works.

7.1.37 Old Bakery, Hillview, Brookside and Corner Cottage were unable to flush toilets due to the sewage system being at capacity.

7.1.38 To the south of Brookside the Great Shefford Stream runs in a culvert beneath the A338 Wantage Road. The stream opens up briefly, south of the road, before flowing into culvert beneath the Petrol Station and Great Shefford Auto Centre. During the flood event, the full width of the A338 Wantage Road was flooded at this location as a result of surface water runoff and the Great Shefford Stream overtopping its bank upstream. The Petrol Station was unaffected by this flood water, but Great Shefford Auto Centre suffered flooding to the internal inspection pits.

7.1.39 N^{o}. 2 Miller's Field experienced external flooding to areas of the garden as a result of water overflowing from the A338 Wantage Road. The property did not experience internal flooding. N^{o}. 4 Miller's Field experienced internal flooding to the kitchen as a result of groundwater rising up through the floorboards.

7.1.40 To the south of the A338 Wantage Road a sluice allows water to enter the WBGWS pipe by the petrol station. The Parish Council flood wardens are responsible for opening and shutting this sluice gate. The gate was opened from late December to late May. Three pumps were installed in this section of the stream to divert water into the WBGWS pipe from the culvert beneath the garage, in an attempt to reduce the volume of water flowing south along the Great Shefford Stream. These pumps were operational from early February to early April. During the height of the floods the water level overtopped the sluice culvert entrance.

7.1.41 The Great Shefford Stream comes out of the culvert by Penny Cottage. Penny Cottage experienced internal flooding as a result of the stream coming out of bank and flowing through the front door of the property. Pumping then prevented further water from entering the property until a power cut on the 14th February. A foul water manhole was surcharging into the stream next to Penny Cottage. As a result the flood water in Penny Cottage contained foul water.

7.1.42 A foul manhole within the garden of Chapel Corner Cottage also surcharged foul water directly into the stream. This property was not affected by flooding however.

7.1.43 Spring Lodge experienced groundwater rising in the garden. Pumping and sandbagging prevented the property from flooding internally. Both the foul manholes in garden were observed to be full but neither surcharged.

7.1.44 To the south west of the Great Shefford Auto Centre the Great Shefford Stream flows as an open channel to join a tributary of the River Lambourn, which then flows into the River Lambourn to the south of the village. This part of the channel has been 'canalised' and artificially narrowed; it was therefore unable to cope with the volume of water.

7.1.45 Lilac Cottage and Phlox Cottage experienced flooding to external areas of the properties as a result of groundwater. Both properties pumped water from within the gardens to prevent flood water entering internal areas. This is not unusual for either property. These properties have FLIP systems for sewerage as a result of historic issues and were therefore unaffected by sewage water.

7.1.46 N^{o}. 2 Ivy Cottages suffered internal flooding as a result of rising groundwater.

7.1.47 Ashbrook, Willowbrook, River Cottage and Bridge House had sewage backing up in their toilets. Willowbrook also had groundwater rising in the garden. This groundwater did not threaten internal areas of the property.

7.1.48 Bridge House experienced flooding to internal areas of the property as a result of rising groundwater. The property pumped but this did not prevent internal flooding.

7.1.49 Mill Cottage experienced groundwater rising beneath the floorboards and in the garden. This water did not flood internal areas of the property.

7.1.50 The Shefford Primary School was closed on the 13th February as a result of issues with sewage and the building being at risk of flooding. Sandbags were deployed in an effort to prevent the school flooding. The school re-opened the following day.

7.2 West Berkshire Council Emergency Response

7.2.1 West Berkshire Council provided sandbags to properties at risk of flooding to supplement those initially supplied by the Parish Council and residents. West Berkshire Council provided the village with approximately 500 additional sandbags in the second week of the flood event.

7.2.2 The A338 Wantage Road was closed for four days at the northern end of the village.

7.2.3 The Great Shefford Flood Warden sourced 2no. 6'' pumps when WBC were initially unable to get any. WBC were eventually able to source further pumps so that 6no. 6'' pumps were then in place. It should be noted that the EA initially resisted requests to connect the pumps into the Groundwater Scheme pipe. Some of the flexible hoses supplied were not strong enough and frequently split as a result of them catching on sharp objects, such as the flints in the field to the east of the village.

7.2.4 Portaloos were provided to the village.

7.2.5 A gully sucker was sent to the village to unblock highway drains on the 10th February.

7.3 Risk Management Authorities

7.3.1 In addition to West Berkshire Council, the following Risk Management Authorities have relevant, flood risk management functions in Great Shefford:

- Environment Agency
- Thames Water

Environment Agency

7.3.2 A fluvial Flood Alert was issued for the River Lambourn from Upper Lambourn to Newbury on the 7th January. This was followed by a Flood Warning for the River Lambourn from Upper Lambourn to Great Shefford on the 6th February. The Flood Warning was removed on the 22nd February.

7.3.3 A Groundwater Flood Alert was issued to the Lambourn valley on the 9th January.

7.3.4 Residents trying to contact the Environment Agency found them to be slow at giving information and in a number of cases did not respond to calls.

7.3.5 West Berkshire Council has not been made aware of any further action taken by the Environment Agency.

Thames Water

7.3.6 Thames Water customer services were reported to not be logging calls, meaning they could not be found when residents called back for updates.

7.3.7 The contractors from Thames Water were not thorough and relied on misinformation from other contractors as opposed to liaising with residents and the Parish Council.

7.3.8 Thames Water was initially unwilling to respond to resident calls about the sewage issues in the Mead, believing the problems to be caused by groundwater ingress in the sewer system. Once Thames Water began investigations on site, the issue was rectified within 1 week. Senior managers at Thames Water then liaised with the Parish Council and kept them informed of progress.

7.3.9 Thames Water cleared and cleaned areas affected by sewage water following the flood event.

7.3.10 West Berkshire Council has not been made aware of any further action taken by Thames Water.

7.4 Recommendations

7.4.1 In order to reduce the risk of flooding in Great Shefford the following measures should be considered:

Maintenance

7.4.2 Frequent maintenance of the ditches and gullies in the parish is recommended to ensure there is sufficient capacity in the channels. This should include sections of the Great Shefford Stream that flow through private property.

7.4.3 Excessive vegetation and any blockages on the Great Shefford Stream should be regularly cleared alongside private gardens to ensure the flow is not impeded.

Major Works

7.4.4 A relief channel should be established in the field to the east of the A338 Wantage Road. A weir installed at the beginning of the channel will ensure a nominal flow is maintained through the existing channel, whilst additional high flows are routed along the new flood relief channel. A box culvert will be required to allow the new channel to pass underneath the farm track to the south. The channel should join the River Lambourn to the south of the village.

7.4.5 A weir should be installed in the Great Shefford Stream to ensure the maximum volume of water is rooted along the overflow channel to the west of the stream. This would help reduce the volume of water in the stream and reduce the risk of flooding to properties along this stretch of the watercourse.

7.4.6 The feasibility and benefits of lining the foul network should be established, and if viable, this action should be undertaken in the village to help reduce the incidence of sewage water backing-up and surcharging from manholes.

7.4.7 In addition to regularly maintaining the Great Shefford Stream, the permanent obstructions in the stream should all be removed to increase the capacity of the channel, and prevent it overtopping its banks due to restrictions in the width and/or height of the watercourse.

Other Works

7.4.8 An investigation should be undertaken into the current control structures for the compensation basins in Spring Meadow to see if the balance between the two basins can be rectified to prevent the water from coming out of bank to the south of the culvert. This would alter the volume of water being released back into the stream from the basins and in turn help reduce the risk of flooding downstream.

7.4.9 An investigation should be undertaken to determine the hydraulics of the surface water sewer system. This investigation should look to establish why the surface water system had capacity in some areas and not others during the flood event. The results of this investigation will determine whether any works can be done to ensure the surface water network drains as much of the flood water as possible.

8 Boxford

8.1 Introduction

8.1.1 The parish of Boxford is located in the centre of West Berkshire to the north-west of Newbury, with the M4 running through the centre of the Parish. Boxford village is located in the centre of the Parish, south of the M4. The village is surrounded by open agricultural land which falls towards the River Lambourn, flowing north to south to the west of the village.

8.1.2 In the winter of 2013-14 the village experienced flooding as a result of high levels in the River Lambourn causing the watercourse and drains discharging into it to come out of bank. The high levels in the river were fed by the high groundwater levels in the Lambourn valley during the winter of 2013-14.

8.1.3 No properties in Boxford suffered flooding to internal areas. However, six properties experienced external flooding. Drawing N^{o}. 70003227/08/101 and 08/102 identify the flooded properties, the approximate flood extents and the directions floodwater took through the village.

8.2 Flooding in Boxford

8.2.1 Levels in the River Lambourn started to rise on the 7th February. The level reached its peak on the 11th February, after which it took approximately two weeks for the river level to recede.

8.2.2 The River Lambourn flows through a number of fields to the west of the village. During times of high flow, the river typically comes out of bank and floods these fields to varying degrees. During the winter 2013-14 flood event, water from the River Lambourn overtopped the western bank, with the most significant breeches located at the northern end of the meadow opposite Glebe End and opposite Oliver's Cottage. This resulted in two overland flow paths flowing from north to south in the field to the west, both approximately 0.5-1m deep and 3-4m wide.

8.2.3 The River Lambourn also came out of bank along the eastern bank, resulting in water collecting in the gardens of a number of the properties situated along the banks of the river. The water also flowed into the grounds of St Andrews Church. Oliver's Cottage installed sandbags as preventative measures in an effort to stop internal flooding; however the water level did not rise to a sufficient height to put the property at risk of internal flooding during this flood event.

8.2.4 Further south, the high water level in the River Lambourn overtopped the spillway next to the pedestrian bridge in the garden of Mill Cottage. The owners of the property installed a number of sandbags around the property in an attempt to protect the property from internal flooding. At its highest, the River Lambourn was 25mm from breaching its banks in this location. However, the water remained in the channel and Mill Cottage was not at immediate risk of internal flooding.

8.2.5 The sluices beneath Mill Cottage were partially dismantled to ensure the capacity of the channel was as great as possible.

8.2.6 On the western side of the River Lambourn two land drains flow north to south towards Winterbourne Road.

8.2.7 The western drain splits before it reaches Winterbourne Road, with one arm flowing east into the eastern drain and the other south, towards Winterbourne Road. During the flood event the western drain contained the water and did not come out of bank at any point. The southern drain connects with the drain south of Winterbourne Road via a concrete culvert. This culvert was never full and no water backed up as a result of incapacity in the culvert.

8.2.8 The large volume of water in the eastern drain resulted in water spilling out and flooding parts of the garden of Brook Cottage. Runoff from the adjacent fields also flowed into the garden of the property due to the topography of this part of the village. The owners or Brook Cottage installed a number of sandbags around the property and covered the airbricks in an effort to prevent the water from flowing into internal areas of the property.

8.2.9 Immediately south of the confluence of the western and eastern drains, the eastern drain splits to form two channels. During the winter 2013-14 flood event both drains were completely swamped by the

flood water, as water collected in the natural bowl in this lower part of the Mill Cottage garden. These channels re-join to form one main channel prior to the embankment, which forms part of the garden of Mill Cottage. The water drains into the River Lambourn via a culvert beneath the embankment. During the flood event, the water collecting in this area overtopped the embankment to flow back into the River Lambourn.

8.2.10 South of Winterbourne Road, River Cottage was also at risk of flooding. The owner of the property dug a ditch along the western boundary of the property to retain the water from the adjacent fields. This ditch prevented the water flooding into the grounds of the property and the cottage did not flood internally.

8.2.11 Water also collected in the field to the north of Shepherd's Hill. This water is understood to have comprised a combination of rising groundwater and overland flow from the surrounding fields. The flood water caused partial flooding to the carriageway, before flowing south along Shepherd's Hill. Shepherd's Hill was also flooded to the south of the foul water pumping station as a result of a blocked highway drain.

8.2.12 Following heavy rainfall during the winter 2013-14 flood event, surface water runoff was seen to emerge from a highway gulley on Winterbourne Road. This water flowed from the gulley to the south west, ponding immediately outside Mill Cottage. The water on the highway did not pose a risk to Mill Cottage. The water drains via two gullies outside the front of the property; however these gulley gratings were seen to be blocked with leaves and debris during the flood event, meaning water was unable to drain away quickly. Several attempts have been made by West Berkshire Council Highways to clear these drains, but to no avail. It is thought the drains are badly rooted and thus, not functioning effectively.

8.2.13 This pool of water presented a significant traffic safety issue, causing vehicles to travel on the opposite side of the road to avoid it. Traffic approaching from the north is blind to vehicles on the wrong side of the road at this point due to the camber of the road.

8.2.14 Blocked highway drains and grips resulted in part of Westbrook Road flooding. In addition to the blocked highway drains, it is understood that the pipe that channels surface water runoff from the road to the western drain is likely to be damaged as it did not appear to be functioning effectively during winter 2013-14.

8.2.15 Further south in the Parish, the pipe beneath Coombesbury Lane was blocked, resulting in an area to the north-west of the road flooding. The ditch alongside the B4000 was also blocked during the winter 2013-14 flood event, due to a lack of maintenance. Water was unable to drain via the ditch, resulting in parts of the road flooding.

8.3 West Berkshire Council Emergency Response

8.3.1 West Berkshire Council notified the Flood Wardens and the Parish Council about the rising water levels.

8.3.2 Sandbags were provided to the village. The majority of the sandbags used during the flood event were privately purchased.

8.3.3 The Army were present in the village to provide support during the flood event.

8.4 Risk Management Authorities

8.4.1 In addition to West Berkshire Council, the following Risk Management Authorities have flood risk management functions in Boxford:

- Environment Agency
- Thames Water

Environment Agency

8.4.2 A Fluvial Flood Alert was issued to the River Lambourn from Upper Lambourn to Newbury on the 7th January. This was followed by a Fluvial Flood Warning for the River Lambourn from Weston to Bagnor, including Boxford on the 6th February.

8.4.3 A Groundwater Flood Alert was issued to the Lambourn valley on the 9th January.

8.4.4 West Berkshire Council has not been made aware of any action taken by the Environment Agency in Boxford.

Thames Water

8.4.5 Thames Water undertook investigative works to the foul sewer system prior to the flood event.

8.4.6 West Berkshire Council has not been made aware of any further action taken by Thames Water in Boxford.

Other authorities

Yorkshire Fire and Rescue Service

8.4.7 The Yorkshire Fire and Rescue Service provided support to the village during the flood event.

8.5 Recommendations

8.5.1 In order to reduce the risk of flooding in Boxford the following measures should be considered:

Maintenance

8.5.2 The drains serving the B4000, Coombesbury Lane, Ownham, Winterbourne Road, Shepherd's Hill and Westbrook Road should be regularly maintained and repaired where necessary, to ensure water is able to flow freely off the highway. The drains serving the B4000 require regular maintenance to clear the excess vegetation which collects in the system in this area.

Minor Works

8.5.3 The condition of the pipe, which takes surface water runoff from Westbrook Road to the River Lambourn, should be assessed to determine if it is damaged, as suspected. If damaged, repairs to the pipe should be undertaken prior to winter 2014-15.

8.5.4 The condition of the highway drains along Shepherd's Hill and Winterbourne Road should be assessed to verify whether the drains are blocked and in a reasonable condition to channel sufficient volumes of water during a flood event. Upgrading works should be undertaken to the network where necessary.

Major Works

8.5.5 An investigation should be undertaken to determine the feasibility of increasing the capacity of the southern section of the western drain, which connects the drain south of Winterbourne Road. These works would need to assess whether the culvert beneath Winterbourne Road is adequate to take an increased flow of water. The downstream effect of the works should be assessed as part of this investigation to ensure the risk of flooding to other areas is not increased as a result of the works.

8.5.6 An investigation should be undertaken to determine whether the embankment which prevents the two drains flowing into the River Lambourn by Mill Cottage can be removed. The downstream effect of removing this embankment should be assessed as part of this investigation to ensure the risk of flooding to areas downstream is not increased. It should be noted that water from the drains flowing into the River Lambourn is at significantly lower hydraulic pressure/flow than the river itself. As part of the investigations into the feasibility of removing the embankment, the likelihood of the River Lambourn flowing along these drains south to north and flooding areas to the north should be assessed.

8.5.7 An investigation into the highway drains and gullies on Winterbourne Road should be undertaken to determine if it is possible to prevent the outflow of water from the gulley, which causes water to collect outside Mill Cottage. The investigation should also assess the capacity and condition of the gullies outside Mill Cottage to help drain water from this area more effectively.

9 Winterbourne

9.1 Introduction

9.1.1 Winterbourne Parish is located in the south of West Berkshire, to the north-west of Newbury. The M4 motorway runs east to west through the centre of the Parish. The majority of the Parish population resides in Winterbourne village, located in the southern half of the Parish, to the south of the M4 motorway. The village is surrounded by agricultural land.

9.1.2 The Winterbourne Stream flows north to south through the centre of the village, alongside Winterbourne Road and through the rear gardens of a number of properties. The Winterbourne Stream is designated as Main River from the point at which it flows beneath the M4, approximately 1km north of the village, to the confluence with the River Lambourn at Bagnor (approximately 2.7km south) to the north-west of Newbury.

9.1.3 In the winter of 2013-14 the village suffered flooding as a result of high levels in the Winterbourne Stream. These high levels were a result of the high groundwater table in the area, which led to increased surface water runoff and overland flows in the surrounding area feeding into the stream. Water ingress into the foul sewer system resulted in capacity in the village being exceeded, with a number of manholes surcharging.

9.1.4 One property suffered flooding to internal areas of the property, with an additional eleven suffering external flooding. Winterbourne Road was flooded in the northern area of the village. Drawing N^{o}. 70003227/09/101 identifies the flooded properties, the approximate flood extents and the directions overland flows took through the village.

9.2 Flooding in Winterbourne

9.2.1 Winterbourne Stream came out of bank to the north of the village, at the northern bridge where the stream flows beneath Winterbourne Road. The stream first came out of bank on the 14th February and the water remained out of the channel for approximately 2 weeks. The water level in the stream was above the road level, causing the water to flow onto Winterbourne Road.

9.2.2 A drainage ditch flows along the eastern side of Winterbourne Road in the northern part of the village. This ditch flows round the eastern side of Bridge Pottery and flows into the Winterbourne Stream just beyond the southern bridge. During the winter 2013-14 flood event water was flowing out of this channel at the point where the ditch enters the garden of Bridge Pottery. It is thought a blockage of some kind is present in the ditch within the grounds of the property, or at the boundary, but this has not been confirmed.

9.2.3 Winterbourne Road was flooded by water from the Winterbourne Stream and the drainage ditch between the northern bridge and the southern bridge. The southern road bridge is slightly raised, preventing the water flowing any further south along the road.

9.2.4 Winterbourne Road was closed for 10 days from the 18th February between the two bridges as it was impossible to tell where the bank of the stream was, thus making it too dangerous to drive along the stretch of road. The water level on the road stayed high for approximately 2 weeks.

9.2.5 Residents attempted to keep the stream in bank by laying sandbags along the bank between the stream and road. The sandbags retained the water in the stream for a few hours, but were insufficient to hold the water back for a significant period of time.

9.2.6 The water from the stream flooded part of the garden of April Cottage to a depth of approximately 300mm. This water did not reach the walls of the property. However, April Cottage experienced

flooding to internal areas as a result of rising groundwater. Water emerged through the floorboards in the hall, situated approximately 25mm lower than the rest of the property. The water was approximately 25mm deep. The water caused damage to the floor and skirting boards in the hallway. The water also seeped up the walls in the lounge and hallway, resulting in the walls being damaged to a height of approximately 300mm. The property owners are looking to raise the hall floor by 25mm to try and reduce the damage to the property as a result of flooding in the future.

9.2.7 April Cottage was extended 13 years ago, with the extension situated slightly below ground level. A series of pipes channel the groundwater from the immediate vicinity of the extension to a pump next to the property. The pump discharges this water every 30 seconds or so to the Winterbourne Stream, to the east of the property. During the flood event, this pump stopped working and the property owner had to replace it with a new pump. The internal flood water level in the property did not increase whilst the pump was not working.

9.2.8 The volume and speed of the water in the Winterbourne Stream during the flood event caused the footbridge over the stream at the front of April Cottage to be washed downstream.

9.2.9 Opposite April Cottage, Bridge Pottery was flooded externally as a result of the Winterbourne Stream coming out of bank and flood water from the roadside ditch. The property is not thought to have suffered any flooding to internal areas. The external water level was approximately 600mm deep, and was up against the western walls of the property, which border the road. The garden of the property was flooded to a depth of approximately 450mm. A pump was installed in an effort to prevent the water from entering Bridge Pottery.

9.2.10 After the stream flows beneath the southern bridge it flows through the rear gardens of a number of properties on the eastern side of Winterbourne Road. The water level in the stream was above the level of the footbridges in these gardens. All of the properties on this side of Winterbourne Road experienced flooding in the gardens to some degree. None of the properties experienced internal flooding and it is understood that none of the properties were at threat of internal flooding from the water. A number of these properties deployed sandbags, but the water did not overtop the sandbags.

9.2.11 South of the southern bridge a number of the foul sewer manholes were surcharging sewage water onto the road, indicating that water ingress in the sewer system meant the network was inundated. The three properties on the eastern side of the road south of the bridge were unable to flush toilets for approximately 2 weeks due to this lack of capacity in the system.

9.3 West Berkshire Council Emergency Response

9.3.1 Sandbags were provided to the village. A number of the villagers also purchased their own sandbags.

9.3.2 West Berkshire Council closed Winterbourne Road for approximately 10 days.

9.4 Risk Management Authorities

9.4.1 In addition to West Berkshire Council, the following Risk Management Authorities have relevant, flood risk management functions in Winterbourne:

- Environment Agency
- Thames Water

Environment Agency

9.4.2 A fluvial Flood Alert was issued along the length of the River Lambourn and its tributaries, from Upper Lambourn to Newbury on the 7th January.

9.4.3 The Environment Agency did not issue any Flood Alerts or Flood Warnings for the Winterbourne Stream, despite the extent of the stream flowing through the village being classified as a Main River. Residents reported that they have not received alerts of warnings from the Environment Agency for past events either.

9.4.4 Environment Agency officers were present in the village on a number of occasions during the flood event.

9.4.5 West Berkshire Council has not been made aware of any further action taken by the Environment Agency.

Thames Water

9.4.6 Thames Water tankered from the foul manholes south of the southern bridge on a number of occasions during the flood event in an effort to alleviate the sewage issues downstream of the bridge.

9.4.7 Thames Water cleared and cleaned the areas affected by sewage flooding.

9.4.8 Thames Water has committed to relining the sewer which runs through Winterbourne in Autumn/Winter 2014. During these works, investigations will also be undertaken into the laterals running into the sewer to determine if they are contributing to the ingress of excessive water. Appropriate action will be taken by Thames Water where required.

9.4.9 West Berkshire Council has not been made aware of any further action taken by Thames Water.

9.5 Recommendations

9.5.1 In order to reduce the risk of flooding in Winterbourne the following measures should be considered:

Minor Works

9.5.2 An investigation should be undertaken into the drainage ditch behind Bridge Pottery to determine whether a blockage or lack of capacity issues are causing water to spill out of the ditch onto the road. Once the cause of the problem is identified, options to address the issue should be identified and where suitable and practical to do so a preferred option to alleviate the flooding should be implemented. The future flood risk to Bridge Pottery from the drainage ditch should be evaluated prior to any works being undertaken to ensure the risk of flooding is not increased.

Regular maintenance of the ordinary watercourses and drainage ditches within the village must be undertaken by the relevant riparian landowners to help reduce the risk of flooding in Winterbourne.

Major Works

9.5.3 The capacity of the northern bridge should be investigated to determine if this is limiting the flow of water in the Winterbourne Stream and causing it to come out of bank and flood Winterbourne Road. If the capacity of the bridge is found to be insufficient to handle significant flows, the capacity should be increased.

9.5.4 Opportunities to create formalised attenuation areas for excess flows from the Winterbourne Stream to the north of the village should be investigated. If possible, these areas could be used to help reduce the volume of water flowing through the village during periods of high flow, reducing the flood risk to the village.

Other Works

9.5.5 An agreement should be reached with the Environment Agency to ensure Winterbourne is provided with Flood Alerts and Flood Warnings associated with the Winterbourne Stream and River Lambourn in the future.

10 Speen

10.1 Introduction

10.1.1 The parish of Speen is located in the south of West Berkshire, to the west of Newbury. The A4 runs east to west through the centre of the Parish and the A34 runs south to north through the eastern section. The majority of the Parish population resides in Speen village, in the east of the Parish. The only settlement to be affected by flooding during the winter 2013-14 flood event was the hamlet of Bagnor, situated alongside the A34, to the north of Speen village. Bagnor is surrounded by agricultural land.

10.1.2 The River Kennet flows west to east through the southern half of the Parish. The River Kennet did not cause any flooding in Speen Parish during the winter 2013-14 flood event. The River Lambourn flows north-west to south-east through the northern section of the Parish, passing through the south-west of Bagnor. The Winterbourne Stream flows north to south along the eastern border of the Parish, joining the River Lambourn to the south-east of the village of Bagnor. The Winterbourne Stream is designated as Main River through Bagnor.

10.1.3 In the winter of 2013-14 the village suffered flooding as a result of high levels in both the River Lambourn and the Winterbourne Stream. The high level of flow in these watercourses resulted from the high groundwater table and the related increase in surface runoff and overland flows in the surrounding area, feeding into the watercourses.

10.1.4 None of the properties in Bagnor suffered flooding to internal areas. Seven properties suffered external flooding, with three of these properties experiencing damage to internal areas of the property as a result of water seeping up the walls. The southern extent of the main road through Bagnor was inundated by flood water. Drawing N^{o}. 70003227/10/101 identifies the flooded properties, the approximate flood extents and the directions flood flows took through the village.

10.2 Flooding in Bagnor

10.2.1 The main tributary of the River Lambourn flows into the village from the west. At the Watermill Theatre the Mill Stream branches off from the River Lambourn and the two watercourses flow in parallel immediately south-west of Bagnor. The Winterbourne Stream flows north to south alongside the main road through Bagnor before flowing into the Mill Stream immediately east of the Watermill Theatre.

10.2.2 The River Lambourn has breached the island between the River and the Mill Stream in a number of places, allowing the River to flow into the Mill Stream. The flow of water into the Mill Stream from the River Lambourn has widened these channels.

10.2.3 The Environment Agency repaired the southernmost breach in September 2013. It is understood that the breaches further up were not repaired at this time as the water had not formed a channel through the island in these places at that time.

10.2.4 During the winter 2013-14 flood event, the high levels of flow in the Winterbourne Stream and the River Lambourn caused high levels in the Mill Stream. The high level in the Mill Stream combined with the additional inflow from the River Lambourn, resulting in significant flooding in the southern part of the village.

10.2.5 It is understood that this flooding was exacerbated by the number of fallen trees downstream of the village in both the River Lambourn and the Mill Stream.

10.2.6 The capacity of the River Lambourn downstream of the southern road bridge in Bagnor was significantly restricted by vegetation in the channel. At its narrowest the River Lambourn is less than 1m

wide due to the vegetation in the channel; the distance between the two banks in this section of the watercourse is approximately 5m. The Environment Agency cleared a section of the river upstream of the southern road bridge in September 2013. These works were undertaken at the same time as the repair to the southernmost breach across the island, and it is understood that the Environment Agency only undertook the vegetation clearance to enable the repair works.

10.2.7 The River Lambourn flows through a sluice immediately downstream of the A34 bridge. This sluice is operated by a local Bagnor resident. The sluice gates were completely open for the duration of the winter 2013-14 flood event. Despite this, there was a 1,500mm difference in the water level either side of the sluice during the flood event as a result of the height of the base of the gates. The gates of the sluice did not restrict the height of the water flowing through them during the flood event.

10.2.8 The Mill Stream was also constrained downstream of Bagnor; the bridge beneath the A34 was considerably blocked with vegetation and silt prior to the flood event. It is thought this blockage exacerbated the level and extent of the flood water upstream in the village.

10.2.9 The Mill Stream came out of bank and flowed across the main road through the village. The flood water inundated the green outside of the Blackbird pub, but the flood water did not enter internal areas of the property.

10.2.10 The flood water surrounded a number of properties in the south-east of the village; Well Cottage, Spring Cottage, Pudding Cottage, Willow End, Fox Grove and The Benhams.

10.2.11 Water completely surrounded Well Cottage, Spring Cottage and Pudding Cottage to a depth of approximately 500mm. Water flowed under the floorboards of the properties and caused damage to the walls to a height of approximately 1m by seeping up the plaster. Water did not come above the floorboards however, meaning there were no areas of standing water in the properties. Much of the water was from groundwater breaking the surface behind the properties.

10.2.12 Since the flood event the owners of Spring Cottage and Pudding Cottage have undertaken a number of works in an effort to protect their properties from future flooding. Spring Cottage has installed a gravel soakaway in the driveway, which channels water, via a culvert beneath the road, to a small land drain in the Benhams. The owners also plan to install a damp-proof course and concrete foundations in an effort to prevent water beneath the property from damaging the walls in future. Pudding Cottage has installed a series of land drains in the grounds of the property in an effort to prevent water flowing beneath and into the property.

10.2.13 The Mill Stream flows along the south edge of the Benhams' garden. During the winter 2013-14 flood event the Mill Stream came out of bank in this area and flooded part of the garden of the property to a depth of approximately 90-100mm. The contours of the garden are designed to channel the water back towards the stream. A row of sandbags were built up around the edge of the patio and the air bricks were temporarily blocked as a precaution in case the water level rose. A 25mm petrol pump and 50mm electric pump were temporarily used to remove the surface water. The Benhams did not suffer any internal flooding.

10.2.14 These properties are all served by sceptic tanks, since no properties in the village are connected to the Thames Water sewer network. The sceptic tanks were not affected by the flood water during the flood event.

10.3 West Berkshire Council Emergency Response

10.3.1 West Berkshire Council closed the main road through Bagnor to reduce further flood damage from bow waves and for safety reasons

10.4 Risk Management Authorities

10.4.1 In addition to West Berkshire Council, the following Risk Management Authorities have relevant, flood risk management functions in Bagnor:

- Environment Agency

Environment Agency

10.4.2 A fluvial Flood Alert was issued along the length of the River Lambourn, including its tributaries, from Upper Lambourn to Newbury on the 7th January.

10.4.3 The Environment Agency did not issue any Flood Alerts or Flood Warnings for the Winterbourne Stream, despite the extent of the stream flowing through the village being classified as a Main River.

10.4.4 West Berkshire Council has not been made aware of any further action taken by the Environment Agency.

10.5 Recommendations

10.5.1 In order to reduce the risk of flooding in Bagnor the following measures should be considered:

Maintenance

10.5.2 The excess in-channel vegetation in the River Lambourn and the Mill Stream needs to be regularly cleared to ensure the maximum flow is able to pass through these watercourses. Larger blockages, such as fallen trees and tree debris need to be removed from the watercourses in the vicinity of Bagnor to ensure blockages are not caused.

Minor Works

10.5.3 The level of the bottom of the sluice gates in the River Lambourn, east of the bridge beneath the A34, needs to be lowered to reduce the volume of water being held back during times of high flow. The downstream implications of these works should be assessed to ensure the risk of flooding will not be increased in other areas as a result.

Major Works

10.5.4 The breaches between the River Lambourn and the Mill Stream need to be repaired to prevent additional flows entering the Mill Stream. These works would help reduce the risk of flooding to the village.

10.5.5 An investigation should be undertaken to determine opportunities to create formalised attenuation areas for excess flows from the River Lambourn in the fields to the south-west of Bagnor. If possible, these areas could be used to help reduce the volume of water flowing through the watercourse during periods of high flow, reducing the flood risk to the village. A reduced volume of water could then be channelled into the Mill Stream during periods of high flow, with the attenuation area being able to deal with the additional volume which would instead being flowing through the River Lambourn.

Other Works

10.5.6 An agreement should be reached with the Environment Agency to ensure Bagnor is provided with Flood Alerts and Flood Warnings associated with the Winterbourne Stream and River Lambourn.

11 Newbury

11.1 Introduction

11.1.1 The town of Newbury is located in the south of West Berkshire to the east of the A34. The parishes of Enborne and Speen are located to the west, Shaw Cum Donnington and Cold Ash to the north and Thatcham and Greenham to the east. The southern boundary is formed by the West Berkshire/ Hampshire border.

11.1.2 The River Kennet, the Kennet & Avon Canal and the River Lambourn flow through the centre of Newbury. There are a number of land drains flowing through and within the town which are associated with these watercourses.

11.1.3 The River Kennet and the Kennet & Avon Canal flow west to east through the town centre. The River Lambourn flows north-west to south-east through the northern area of the town, before joining the River Kennet between Newbury and Thatcham.

11.1.4 In the winter of 2013-14 three areas of Newbury experienced flooding issues. The area alongside the River Kennet, to the south-west of the town centre know as West Mills suffered flooding as a result of high levels on the River Kennet and high volumes of surface water runoff. Properties located along the River Lambourn, in Shaw, experienced fluvial flooding as a result of high levels on the river. High volumes of surface water runoff also resulted in issues with the sewage system in this area. Properties south of Newbury Cemetery at Cromwell Road and Wellington Close experienced flooding as a result of overland flow from a groundwater source north of the Cemetery.

11.1.5 Forty-one properties in Newbury experienced flooding to internal areas. An additional eighteen properties experienced external flooding and one further property had flood water in the cellar. Northcroft Lane, Northbrook Street, Shaw Road and Cromwell Road also experienced flooding to varying depths. Drawing N^{o}. 70003227/11/101 to 103 identify the flooded properties, the approximate flood extents and the directions flood flows took through the town.

11.2 Flooding in Newbury

River Kennet and Kennet & Avon Canal

11.2.1 Levels on the River Kennet and Kennet & Avon Canal were high throughout January and peaked at the beginning of February.

11.2.2 Both watercourses came out of bank to the west of the town centre, flooding land surrounding the Northcroft Leisure Centre. The leisure centre was still accessible during this period and continued to operate.

11.2.3 On the 8th February the River Kennet caused internal flooding to one commercial property: the Lock Stock and Barrel Pub; and one residential property: Old Mill House. Old Mill House attempted to pump water away from the property, but this did not have any affect.

11.2.4 The eastern section of Northcroft Lane was partially flooded. It is understood that this flooding was a result of surface water runoff as opposed to the River Kennet coming out of bank at this point. It is thought surface water was unable to drain into the river as the automatic valves in the surface water network in Northcroft Lane were closed as a result of the high levels in the river.

11.2.5 The surface water flooding on the carriageway of Northcroft Lane caused internal flooding to two commercial properties; the Salvation Army charity shop and Valder's Hair, and one residential property; N^{o}. 1b Northcroft Lane. The Environment Agency pumped surface water from the carriageway outside the Salvation Army charity shop into the River Kennet in an effort to reduce the flood levels in these properties. Pumping began in the second week of February and was undertaken 24 hours a day for approximately one week.

11.2.6 Surface water runoff also affected Swan Court off of Northcroft Lane due to a significant amount of water collecting in the car park, threatening the ground floor flats. The runoff that had collected in the car park was unable to flow into the River Kennet to the south as the access to a second car parking area, located alongside the river, is significantly raised. This is part of the Newbury Flood Alleviation Scheme (FAS) and is designed that way to prevent water from the River Kennet over flowing into the first car park and flooding the flats when the river is out of bank.

11.2.7 This area of Newbury is serviced by a combined foul and surface water sewer system. It is believed that the runoff in and around Swan Court was unable to drain into this combined system as the sewer was inundated with surface water runoff.

11.2.8 The combined sewer system being at capacity also meant the residents of Swan Court were unable to use their showers and toilets. The ground floor flats in Swan Court all have flood door guards but these were of limited use during the winter 2013-14 flood event as residents needed to exit the properties on a regular basis as they were unable to use their toilets. A number of elderly residents moved out for the duration of the flood event.

11.2.9 Berkshire Fire and Rescue Service pumped surface water from the first car park of Swan Court to the river. After 24 hours the Environment Agency took over pumping.

11.2.10 Further west along Northcroft Lane the residential properties were protected from fluvial flooding by a flood wall constructed along the ends of the rear gardens. This wall is also part of the Newbury FAS and was built by the Environment Agency in 2013.

11.2.11 However, these properties were affected by issues with the sewage system, being served by the same combined sewer system as Swan Court. The residents of Northcroft Lane were unable to use their toilets or showers during the flood event. The sewer system did not overflow or surcharge along Northcroft Lane.

11.2.12 Further north, on Northbrook Street at the junction with Park Street, foul water was seen to be surcharging from a number of manholes, flooding an area of the carriageway. It is thought foul water surcharged from the system due to a blockage as opposed to a lack of capacity in the system. This has not been confirmed by Thames Water.

11.2.13 To the east, the Kennet and Avon Canal came out of bank, resulting in flooding to two businesses; Greenham Lock Marina Ltd and the Dry Dock Company. It is not known whether these two properties suffered internal flooding.

River Lambourn - Fluvial flooding

11.2.14 The River Lambourn overtopped its banks in a number of places in the Shaw area.

11.2.15 To the west of Shaw Bridge, on Church Road, the Millers House, N^{o}. 1 Shaw Mill and N^{o}. 2 Shaw Mill suffered flooding to internal areas of the properties as a result of the River Lambourn coming out of bank.

11.2.16 On the south side of the river, water came out of bank and flooded the rear gardens of N^{o}. 112 and 107 Shaw Road in early February, rising up to flood internal areas of the properties on the 5th February.

11.2.17 Further south on Shaw Road, surface water collected in a low point on the highway, causing internal flooding to N^{o}. 91, 93 and 96. The highway drains in this area were inundated with surface water and fluvial water as a result of the River Lambourn coming out of bank. This caused water to back-up and the surface water on the highway in this area was unable to drain away.

11.2.18 The cellars of N^{o}.s 49 and 51 Shaw Road were flooded to a depth of 150mm on the 7th February. This water continued to rise and caused internal flooding to areas of N^{o}.49. It is thought this flooding resulted from rising groundwater beneath the properties. No other properties in the vicinity were affected.

11.2.19 The River Lambourn also came out of bank to the east of Shaw Bridge. The water caused internal flooding to N^{o}. 1, 2 and 3 Mill View, Riverine and Norwood House, all of which are located on Kiln Road.

11.2.20 N^{o}. 11 Glebefields experienced external flooding in the front garden of the property as a result of the River Lambourn coming out of bank. It is understood that none of the other properties in Glebefields were affected during the winter 2013-14 flood event.

11.2.21 Further east, N^{o}. 20 Kiln Road experienced external flooding to areas of the rear garden as a result of flood waters from the River Lambourn.

11.2.22 To the south, the River Lambourn, Newport Road. N^{o}. 53, 55, 57, 59, 61, 67, 73 and 96 are confirmed to have been affected by flood waters externally. Other adjacent river bordering properties on Newport Road are also known to have had external flooding in the gardens but the extent of the flooding has not been confirmed.

11.2.23 Properties in Newport Road were also affected by foul water flooding as a result of the foul sewer system becoming inundated by river water. This inundation resulted in the foul manholes in the northern part of Newport Road surcharging on the 6th February. The foul water flooded the highway and caused internal flooding to areas of N^{o}. 60. N^{o}. 52, 54, 56, and 58 were also affected by this foul water, but it is understood that the water was confined to the gardens of these properties.

11.2.24 Further east the River Lambourn came out of bank on both sides of the channel alongside Riverside Lane. The only property to be affected along this extent of the river was No. 3 Riverside Lane, which is understood to have only suffered external flooding in the rear garden.

11.2.25 The gardens of Lambourn Court were flooded on the 11th February. The water level continued to rise in the gardens and three vulnerable residents were evacuated on the 14th February. These properties were not flooded internally.

Groundwater flooding

11.2.26 Groundwater emerged in the field to the east of Red Farm House off of the B4009Long Lane. This water combined with overland flow from the heavy rainfall and flowed south towards Long Lane. The road initially held the water back, causing a large pool of water to form in the field adjacent to the road. The increase in flood water eventually caused water to across the road and into the fields to the east of Long Lane.

11.2.27 The water flowed through Newbury Cemetery. To the south of the cemetery the water flowed on through the rear gardens of properties on Cromwell Road. On the 7th February the flood water flowed onto the road, causing internal flooding to seven properties; N^{o}. 53, 55, 57, 59, 78, 80 and 88 Cromwell Road.

11.2.28 Four further properties in Cromwell Road experienced external flooding; N^{o}. 61, 82, 84 and 86.

11.2.29 The flow path continued south through the rear gardens of properties in Cromwell Road and caused internal flooding to eight properties in Wellington Road; N^{o}. 1, 3, 5, 7, 11, 15, 17 and 19. All eight properties had to be vacated following the flooding due to the significant damage caused by the flooding.

11.2.30 Approximately 600mm deep flood water collected in the gardens of the properties in Wellington Road, flowing into internal areas of these properties on the 8th February. The flood water was unable to drain away via the surface water network, despite the drains in the area being cleared the day before.

11.2.31 Sovereign Housing (Housing Association) evacuated the residents of N^{o}. 55, 78, 80, 82 and 84 Cromwell Road on the 8th February at the request of the residents.

11.2.32 Cromwell Road was closed on the 7th February as a result of the volume of flood water.

11.2.33 Further south on Cromwell Road, sewage was surcharging from the foul manhole located within the garden of N^{o}. 21. This water did not enter the property, but flooded areas of the garden.

11.3 West Berkshire Council Emergency Response

11.3.1 West Berkshire Council provided sandbags to the affected areas.

11.3.2 Some residents noted that the information provided by the West Berkshire Council 24 hour support line was incorrect.

11.3.3 Cromwell Road was closed by West Berkshire Council.

11.4 Risk Management Authorities

11.4.1 In addition to West Berkshire Council, the following Risk Management Authorities have relevant, flood risk management functions in Newbury:

- Environment Agency
- Thames Water

Environment Agency

11.4.2 The Environment Agency issued a Groundwater Flood Alert for the Lambourn Valley on the 9th January.

11.4.3 The Environment Agency issued a Fluvial Flood Alert for the River Lambourn and its tributaries from Upper Lambourn to Newbury on the 7th January. This was followed by a Fluvial Flood Warning from Donnington to Newbury on the 12th February. This warning was removed on the 24th February.

11.4.4 Two Fluvial Flood Alerts were issued for the River Kennet from Berwick Bassett to Newbury, one on the 24th December, which was removed on the 25th December, and one on the 4th January, which was removed on the 24th March.

11.4.5 The Environment Agency undertook pumping at Swan Court off Northcroft Lane.

11.4.6 West Berkshire Council has not been aware of any further action taken by the Environment Agency.

Thames Water

11.4.7 Thames Water was slow to respond to requests for help from residents.

11.4.8 Thames Water undertook clearing and cleaning of areas of raw sewage. It is not known whether these actions were communicated to residents in the affected areas or how regularly clearing occurred.

11.4.9 West Berkshire Council has not been aware of any further action taken by Thames Water.

Royal Berkshire Fire and Rescue Service

11.4.10 The Fire and Rescue Service assisted affected residents in Cromwell Road moving furniture upstairs during the evening of the 7th February.

11.4.11 Berkshire Fire and Rescue Service also pumped surface water from the first car park of Swan Court to the River Kennet.

11.5 Recommendations

11.5.1 In order to reduce the extent of flooding in Newbury the following measures should be considered:

Maintenance

11.5.2 The highway drainage network should be checked following the flood event to ensure the inundation of the system from surface runoff and flood water has not resulted in large volumes of sediment and other waste causing blockages to the network.

Minor works

11.5.3 A funding application has been made to the Environment Agency for property level protection to be installed at the properties affected by flooding in Cromwell Road and Wellington Close. Property level protection measures, including flood barriers, air brick caps and sealing external walls, would help protect these properties against future overland flows as a result of rising groundwater to the north of the cemetery.

Major works

11.5.4 Works have begun to construct a bund to the north of Newbury Cemetery to hold the overland flow from the emerging groundwater back in the field between Long Lane and the cemetery. A new drainage pipe will be constructed through the cemetery, which will connect into the existing highway drainage network in Cromwell Road. These works will help reduce the risk from the overland flow route to the properties in Cromwell Road and Wellington Close.

11.5.5 An investigation needs to be undertaken by Thames Water to establish the condition of the foul and combined sewer network in the areas of Newbury affected by foul water flooding. These investigative works should focus on identifying damaged areas, with any necessary works undertaken to ensure the amount of surface water, groundwater and fluvial water overloading the foul network is reduced in the future. An alternative option for Thames Water to consider would be the possibility of increasing the capacity of the pumping station to remove the water from the foul system faster.

12 Woolhampton

12.1 Introduction

12.1.1 Woolhampton Parish is located east of Thatcham along the Bath Road (A4), in the Kennet Valley. The Parish is one of the smaller parishes in West Berkshire and is surrounded by six others.

12.1.2 The River Kennet and the Kennet and Avon Canal converge to become the River Kennet/Canal immediately west of the parish boundary. The River Kennet/Canal flows west to east through the southern section of the parish. The River Enborne flows along the southern boundary of Woolhampton Parish.

12.1.3 Woolhampton village is located in the south-west of the parish, north of the River Kennet/Canal, and alongside the Bath Road (A4). The (Reading to Exeter) mainline railway runs on an embankment east to west through the village, just north of the River Kennet/Canal. The land to the north of the village slopes steeply down towards the Bath Road (A4) and the River Kennet/Canal.

12.1.4 The Mill Stream flows initially north to south the eastwards through the village, passing in culvert under Station Road and then under the railway, before discharging into the River Kennet/Canal.

12.1.5 In the winter of 2013-14 the village suffered flooding as a result of high levels in the River Enborne, River Kennet, the River Kennet/Canal and the Mill Stream. High volumes of surface water runoff flowing into the foul sewer system also resulted in the sewer system backing up. The majority of the properties affected in the village suffered as a result of fluvial flooding from the River Kennet/Canal.

12.1.6 Three properties suffered flooding to internal areas of their property, with an additional seven suffering external flooding and/or flooding to outbuildings. Station Road was flooded in two locations. Drawing N^{o}s. 70003227/14/101 and 102 identify the flooded properties, the approximate flood extents and the directions overland flows took through the village.

12.2 Flooding in Woolhampton

Fluvial flooding – River Enborne

12.2.1 Woolhampton parish was first affected by flooding from the River Enborne on Christmas Eve. The river came out of bank south of Woolhampton, on the border of Brimpton and Wasing, and flowed through the fields to the north of the river, across Station Road and collected in the field to the north of the road.

12.2.2 As a result of the river coming out of bank Bottle Cottage suffered flooding to internal areas of the property to a depth of approximately 150mm. The water flooded the property within the space of 20 minutes due to the speed at which the water was flowing across the fields from the river. The fluvial flood water affecting the property also flooded the property's sceptic tank, resulting in sewage water entering the property.

12.2.3 West Berkshire Council provided 2 pumps to clear the water from the property. The property is situated in a dip, meaning the water would have been unable to drain away naturally. The 2 pumps served to clear the flood water from the property within 24 hours.

12.2.4 Bottle Cottage also suffered surface water flooding to external areas of the property in the middle of February, but the cottage was not flooded internally.

Fluvial flooding – River Kennet & River Kennet/Canal

12.2.5 The River Kennet burst its banks at two points to the south-west of the village on the 13th February. From these points the water flowed into the sand and gravel pit lake. The level of water in this lake is normally 3m below the surrounding ground, but was already higher than normal due to the groundwater level in the area being high. During the flood event the additional volume of water from the River Kennet caused the lake to overtop.

12.2.6 Water normally drains from this lake via a drainage ditch to the east, which discharges to the River Kennet/Canal. During the flood event, both the drainage ditch and the lake were unable to cope with the volume of water, resulting in water spilling out of the lake and ditch. An area of Station Road was flooded due to the lack of capacity in the culvert which normally channels flows beneath the road.

12.2.7 Further north, the River Kennet/Canal came out of bank, causing internal flooding to two properties; Bridge Cottage and The Huts. Bridge Cottage flooded to a depth of 50mm and the Huts to 100mm.

12.2.8 Outbuildings associated with the Rowbarge pub were also flooded as a result of the River Kennet/Canal coming out of bank.

12.2.9 Anecdotally it is thought that if the River Kennet had not breached at the two points to the south-west of the village, the volume of water in the river would have caused significant flooding to the Angel Mead area of the village.

Fluvial flooding – Mill Stream

12.2.10 The flow in the Mill Stream originated in Breakneck Copse and Wernham's Wood, to the north of the village, and flows into culvert beneath the properties between New Road Hill and Woolhampton Hill. The stream emerges from culvert south of the Bath Road (A4). The stream has an overflow at the western railway culvert to the Kennet and Avon Canal. The western culvert overflow is controlled by a weir and therefore, only flows when The Mill Stream flow is high enough. The Mill Stream flows east beneath Station Road, and then beneath the railway via the eastern culvert, to discharge to the River Kennet/Canal. The maintenance regime for these culverts is unknown, but Network Rail last cleared them in autumn 2007. The Parish Council believe that the culverts become badly silted in places, although the eastern culvert is currently clear.

12.2.11 The invert level of the Mill Stream south of the railway is very similar to the river level. Therefore, when the River Kennet/Canal is high the Mill Stream is not able to flow away.

12.2.12 In the middle of February (from approximately the 13th to 18th) the high levels in the River Kennet/Canal meant a significant volume of water was unable to flow through the culverts, leading to the Mill Stream coming out of bank upstream of both culverts.

12.2.13 At the western culvert, the flood water collected in the field immediately upstream. At the eastern culvert, the flood water collected on either side of the stream. An area of reed beds is located near the eastern culvert. Water from the reed beds typically flows east in a series of drainage ditches. During the flood event a significant volume of water collected in the reed beds, flowing back towards the Mill Stream.

12.2.14 Network Rail has constructed a drainage ditch alongside the northern embankment of the railway, in the vicinity of the eastern culvert, back towards a second culvert at the bottom of the garden at Tonjilan. In normal conditions the Mill Stream flows into this drainage ditch, backing up against the railway embankment. It is thought the presence of this ditch exacerbated the flooding in this area.

12.2.15 Two properties experienced flooding to external areas as a result of flood water associated with the eastern culvert; Millside and Tonjilan. The rear garden of Tonjilan was flooded to a depth of approximately 300mm and Millside garden was flooded to between 300mm and 450mm deep.

Sewer Flooding

12.2.16 Woolhampton also suffered sewer flooding at Christmas and during the middle of February. The sewer system backed-up on Station Road following heavy rainfall and flooded the front gardens of five properties on the west side of Station Road; Millbrook, Fistral, the Gates, Tonjilan and the Old Mill Stones. All five properties also experienced issues flushing toilets during this time.

12.2.17 Sewer flooding in this area of the village is a historic problem that has been occurring for approximately 8 years. It is believed that surface water runoff from the village flows into the foul sewer system and inundates the system during heavy rainfall events.

12.2.18 The Parish Council has been liaising with Thames Water for a number of years to try and alleviate the issue. Thames Water installed flow monitors in the foul system in spring 2014 in an attempt to establish where the surface water runoff is entering the system.

12.3 West Berkshire Council Emergency Response

12.3.1 West Berkshire Council provided 2 pumps to Bottle Cottage on Christmas Eve.

12.3.2 Sandbags were provided to the village on the 13th February.

12.3.3 Station Road was closed on Christmas Eve and on the 15th February.

12.4 Risk Management Authorities

12.4.1 In addition to West Berkshire Council, the following Risk Management Authorities have relevant, flood risk management functions in Woolhampton:

- Environment Agency
- Thames Water

Environment Agency

12.4.2 A fluvial Flood Alert was issued for the River Kennet from Thatcham to Reading on the 23rd December and removed on the 28th December. A second fluvial Flood Alert was issued for this extent of the Kennet on the 2nd January and removed on the 17th March.

12.4.3 A number of fluvial Flood Alerts were issued for the River Enborne. The first was issued on the 23rd December and removed on the 25th December. A second alert was issued on the 2nd January and removed on the 9th. The third alert was issued on the 1st February and removed on the 2nd. The final alert was issued on the 5th February and removed on the 18th.

12.4.4 West Berkshire Council has not been made aware of any further action taken by the Environment Agency.

Thames Water

12.4.5 Thames Water cleared and cleaned the areas affected by sewage flooding.

12.4.6 West Berkshire Council has not been made aware of any further action taken by Thames Water.

12.5 Recommendations

12.5.1 In order to reduce the risk of flooding in Woolhampton the following measures should be considered:

Maintenance

12.5.2 Ditches and ordinary watercourses in the parish need to be regularly cleared of silt and debris to ensure surface water runoff is able to effectively drain off the land.

12.5.3 West Berkshire Council and Network Rail should agree the regularity with which the culverts beneath the railway are cleared and, where necessary, West Berkshire Council should agree to take on the responsibility if Network Rail is unwilling to do so.

12.5.4 The cuttings from hedge trimming works need to be cleared when works are undertaken as they are being washed into roadside ditches and causing blockages.

12.5.5 Fallen trees along the rivers need to be cleared as these trees are restricting the flow of water in the channels during times of high flow.

Minor Works

12.5.6 Following the 2007 flood event the Mill Stream, including the culvert beneath New Road Hill, has been stringently maintained and improvement works have been undertaken as required by West Berkshire Council. The trash screen at the entrance to the culvert is due to be replaced with a screen that can be maintained more easily. The footbridge will also be repaired to allow access for clearing the channel. These works will help ensure surface water runoff from the village is able to flow away freely, reducing the flood risk.

Major Works

12.5.7 A bund should be constructed to the north of the River Enborne, south of Station Road, to ensure water is kept within the floodplain and does not spill out onto the road. This bund would also serve to protect Bottle Cottage from fluvial flooding from the River Enborne in the future.

12.5.8 An investigation should be undertaken to determine whether water flows from the River Kennet through the culverts beneath the railway during times of high flow. If this is found to be the case, non-return valves should be fitted to the two culverts to ensure the land to the north of the railway embankment serves as floodplain for the Mill Stream only.

Other Works

12.5.9 The Parish Council are keen to set up Flood Wardens for the village and would like West Berkshire Council's support in doing this.

12.5.10 It is important that the breach locations in the River Kennet are not bunded and water continues to be allowed to flow out of bank into the floodplain at these locations.

13 Theale

13.1 Introduction

13.1.1 The Parish of Theale is located in the south-east of West Berkshire, to the west of Reading. The A4 Bath Road runs east to west through the centre of the parish and the M4 runs along the eastern boundary. The Reading to Exeter railway line runs from east to west through the southern half of the parish. The Kennet & Avon Canal flows west to east along the southern boundary of the parish, with the confluence of the River Kennet and the Kennet & Avon Canal located immediately to the south-west of the boundary. A number of large lakes from former gravel extraction are located in the south-west and south-east corners of the parish, north of the Kennet & Avon Canal. These lakes are connected by sluices, which allow the flow of water between them to be regulated.

13.1.2 The town of Theale is the main populated area within the parish, with the majority of residential development located to the north of the A4 Bath Road. A series of commercial and industrial areas are located south of the A4 Bath Road, in the eastern half of the parish.

13.1.3 In the winter of 2013-14 the main area affected within Theale parish was in the vicinity of New Mill, to the south of the parish. This area suffered as a result of high levels in the River Kennet, the Kennet & Avon Canal, Draper's Osier Bed Stream and the various branches of these watercourses. The industrial units along Arrowhead Road also suffered flooding as a result of high levels in the River Kennet.

13.1.4 Five properties suffered flooding to internal areas with an additional six suffering external flooding and/or flooding to outbuildings. Station Road was also flooded. Drawing Nos. 70003227/17/101 and 102 identify the flooded properties, the approximate flood extents and the directions overland flows took through the area.

13.2 Flooding in Theale

13.2.1 Following heavy rainfall on the 23rd December the level of the River Kennet and the Kennet & Avon Canal rapidly increased. This caused both the River Kennet and Draper's Osier Bed Stream to come out of bank in the vicinity of Theale.

13.2.2 Draper's Osier Bed Stream branches off the River Kennet to the south-west of Theale and flows in a north-easterly direction to the south of the town. Flow into Draper's Osier Bed Stream from the River Kennet is controlled by a weir. A fish pass has recently been installed upstream of the weir; flow into the pass is not controlled. Following heavy rainfall in late December, both the weir and the fish pass allowed a significant volume of flow to pass from the River Kennet into Draper's Osier Bed Stream.

13.2.3 The increased volume of water in Draper's Osier Bed Stream caused it to overtop and flow into Haywards Farm Lake to the south. The water in Haywards Farm Lake overtopped into the floodplain to the north-west. Water collected in the floodplain for 3 months from late December to the end of March. The floodplain has had water in 4 times over the last 8 years, but never for this length of time. Excess water from this floodplain flows into the two drainage ditches which run along either side of the access track for New Mill Cottages.

13.2.4 The ditch on the southern side of the access track is fed by an outfall from the River Kennet to the south-west, near to Sheffield Weir. The ditch to the north of the track is a field drain for the floodplain.

During the winter 2013-14 flood event both drains were inundated with water from both the River Kennet and the floodplain to the north.

13.2.5 During normal flow conditions, these ditches drain excess flow to the east, via a 150mm diameter culvert beneath Station Road. The water then discharges back into Draper's Osier Bed Stream and then to the River Kennet to the north-east. During the winter 2013-14 flood event the culvert underneath Station Road was unable to deal with the volume of water, causing the water to back-up. It is understood the culvert was also partially blocked prior to the flood event, further reducing its capacity. The incapacity in the culvert caused water to come out of bank and flood Station Road, as well as the access track for New Mill Cottages. Station Road was closed due to the depth of the flood water on the 5th February.

13.2.6 To the south of New Mill Cottages, the River Kennet and the mill race at Sheffield Mill overtopped, flooding the land to the rear of New Mill, Sheffield Mill and New Mill Cottages. The flood water from the ditch in front of New Mill Cottages converged with this water behind the properties.

13.2.7 No. 1, 2 and 3 New Mill Cottages experienced internal flooding on Christmas Eve, in the first week of February and in the second week of February. The internal flood water completely receded between each event.

13.2.8 On each occasion flood water flowed towards the properties up the rear gardens. On Christmas Eve the gardens went from being dry to inundated to a depth of 600mm in an hour and a half. During February the rear gardens remained under approximately 700mm of flood water for the whole month.

13.2.9 During all three flood events water from the rear of the properties combined with the water from the ditches at the front, flooding the driveways and surrounding the houses. In early February the access track became impassable within a few hours of the water level rising. Residents reported that the flood water in front of the properties was flowing towards Station Road at a significant velocity, and was quite dangerous at times.

13.2.10 New Mill Cottages were flooded internally as a result of water coming up through the floors and seals of the doors; this water is thought not to be groundwater as the three properties sit on a concrete plinth. On Christmas Eve the properties were flooded internally to a depth of between 10mm and 40mm, with the water depth increasing to between 75mm and 100mm during the two February events. The internal flood water receded within a few hours of the peak of the event on all three occasions.

13.2.11 The three properties are served by a sceptic tank and flood water ingressed into the system and caused sewage water to mix with the fluvial water in the garden. It is understood that this foul water entered internal areas of the properties during the two February flood events.

13.2.12 Water flowed over the driveways of Mill Lane Cottages for a fourth time during the middle of March; this water did not affect internal areas of the Cottages.

13.2.13 External areas of Sheffield Mill and Garden Cottage were flooded on Christmas Eve, but the water did not ingress into the properties. The flood water had receded from the vicinity of the properties by the evening of the 24th December.

13.2.14 Sheffield Mill and Garden Cottage experienced flooding to internal areas during early February. This is reportedly the first time Garden Cottage has suffered internal flooding since its construction during the 18th Century. Bridge House, Ivy Cottage, Watersmeet and No.s 1 and 2 Swing Bridge all suffered external flooding during February.

13.2.15 Hayward Farm House experienced flooding to external areas of the property during February as a result of overland flow from the north. This overland flow originates from surface water runoff from the

railway, which flows between the Lake and the railway in a north-easterly direction, along the access track. When this water meets Station Road, it flows south towards the Farm.

13.2.16 During February a number of grips were dug in the southern bank of the Kennet and Avon Canal just upstream of Sheffield Lock to allow excess volume in the canal to be attenuated in the car park. Residents felt that this action helped reduce the volume of water flowing downstream from Theale as opposed to aiding the properties in Theale.

13.2.17 To the north of the New Mill area, a number of the industrial properties associated with Arrowhead Road experienced external flooding, predominantly concentrated in the car park areas. This flood water was associated with the high levels in the River Kennet. It is not known whether the water flooded this area via seepage through the gravels associated with the river, or via water coming up through the drains. It is understood some of the industrial units experienced internal flooding, but specific units and severity of the flooding is not known. A section of Arrowhead Road, adjacent to the river monitoring station, was flooded to a depth that made it impassable to small vehicles.

13.3 West Berkshire Council Emergency Response

13.3.1 West Berkshire Council closed Station Road in early February.

13.4 Risk Management Authorities

13.4.1 In addition to West Berkshire Council, the following Risk Management Authorities have relevant, flood risk management functions in Theale:

- Environment Agency

Environment Agency

13.4.2 A fluvial Flood Alert was issued for the River Kennet from Thatcham to Reading on the 23rd December and removed on the 28th December. A second Fluvial Flood Alert was issued for this extent of the Kennet on the 2nd January and removed on the 17th March. A number of fluvial Flood Warnings were issued for the River Kennet from Theale to Reading. The first was issued on the 24th December and removed on the 26th, the second was issued on the 5th February and removed on the 22nd February, and the final warning was issued on the 3rd March and removed on the 5th March.

13.4.3 West Berkshire Council has not been made aware of any further action taken by the Environment Agency.

13.5 Recommendations

13.5.1 In order to reduce the risk of flooding in Theale the following measures should be considered:

Maintenance

13.5.2 The land drainage ditches alongside the access track for New Mill Cottages need to be regularly cleared of silt and debris to ensure surface water runoff is able to effectively drain off the land and to ensure the capacity of these channels is not reduced. The vegetation along the channels should also be regularly cleared to ensure the flow is not impeded or restricted.

13.5.3 Both the culverts beneath Station Road (associated with the drainage ditches and Draper's Osier Bed Stream) should be regularly maintained to ensure it does not become blocked and is able to operate at full capacity during high flow events.

Minor Works

13.5.4 The possibility of creating channels from Draper's Osier Bed Stream to the surrounding fishing lakes in order to provide flood storage should be investigated.

13.5.5 The sceptic tanks should be fitted with sealed covers for the properties in the affected in this part of Theale. Any opportunity for flood water to enter these systems should be sealed.

Major Works

13.5.6 An investigation should be undertaken to determine whether the capacity of the 150mm diameter culvert beneath Station Road is sufficient during high flow events. If this culvert is found to be too small, it should be replaced with a larger diameter structure to help reduce the likelihood of the watercourse backing-up and flooding New Mill Cottages. The downstream impact of increasing the size of this culvert should be investigated to ensure flood risk is not increased to properties elsewhere.

13.5.7 The level of the access track to New Mill Cottages should be raised, or a bund constructed to the north of the track, to keep the water in the floodplain and stop it flowing towards New Mill Cottages. Alternatively, the banks of Haywards Farm Lake could be raised to reduce the volume of water overtopping from this lake into the floodplain. Both of these measures would require an investigation into the downstream impact to ensure flood risk is not increased to properties elsewhere.

13.5.8 The bank of Draper's Osier Bed Stream, at the point where the stream overtops into Haywards Farm Lake, could be raised to reduce the volume of water spilling into the lake and the floodplain. The downstream impact of retaining the water in the stream should be investigated prior to undertaking these works.

13.5.9 Controls need to be installed at the weir and fish pass at the head of Draper's Osier Bed Stream to better control the volume of water flowing through the stream. If the channel were to breach in the future, the controls could be used to reduce the volume in the channel and prevent it continuing to flood out of bank.

13.5.10 The grips dug in the southern bank of the Kennet and Avon Canal, upstream of Sheffield Lock, should be formalised to help reduce the risk of flooding to the properties in this area in the future.

13.5.11 The source of the flooding at Arrowhead Road should be investigated to determine whether the water seeped via the gravels or coming up via the drainage network. If water is found to have flowed via the drainage network, non-return valves should be installed for the industrial units in this area.

13.5.12 The feasibility of raising the section of Arrowhead Road that was flooded should be investigated to determine whether this would help alleviate the risk of flooding in the future.

Other Works

13.5.13 A management plan should be established for the various watercourses in the vicinity of Theale. This management plan should set out who is responsible for opening the various sluices and locks and how these individuals and/or organisations will know to open and close these structures. Maintenance along the length of the watercourses also needs to be better coordinated, and the management plan should set out those with a responsibility for maintenance and the intervals at which it is required.

14 Burghfield

Introduction

14.1 The Parish of Burghfield is located to the south-east of the District, immediately west of Reading. The M4 passes through the parish to the north. The Kennet & Avon Canal and the River Kennet flow from west to east through the northern section of the parish. A number of large lakes from former gravel works and a reservoir are located to the south of the parish, south of the River Kennet. The land slopes from south to north, towards the River Kennet.

14.2 Burghfield Common is the main populated area within the parish. Burghfield Hill, Burghfield, Sheffield Bottom, Burghfield Bridge and Pingewood are also located within the parish.

14.3 In the winter of 2013-14 the main areas affected within Burghfield parish were Sheffield Bottom, Burghfield Bridge and Pingewood. All three areas suffered as a result of high levels in the River Kennet and Kennet and Avon Canal causing these watercourses to overtop.

14.4 Downstream of Burghfield Bridge there are seven sluices along the Kennet and Avon Canal. These sluices are designed to allow excess water to flow into a privately owned fishing lake to the south. During the flood event the sluices were fully open, operating as intended. Therefore, these features are not considered to have contributed to the over-topping of the Canal.

14.5 Eighteen properties suffered flooding to internal areas of their property with an additional four suffering external flooding and/or flooding to outbuildings. Hanger Road, Deans Copse Road, Mill Road, Burghfield Road, Pingewood Road North, Berry Lane, Kirtons Farm Road and Cottage Lane were also flooded. Drawing Nos. 70003227/16/101, 18/102, 18/103 and 19/104 identify the flooded properties, the approximate flood extents and the directions the overland flows took through the affected areas.

Flooding in Sheffield Bottom

14.6 The area of Sheffield Bottom was first flooded on Christmas Eve 2013 as a result of a significant increase in the levels in the River Kennet and Kennet & Avon Canal, following the heavy rainfall on the 23rd December.

14.7 The River Kennet overtopped into Woolwich Green West Lake (refer to drawing 70003227/18/101). The increased level in the lake caused it to overtop in several places into a stream to the south, which flows between Woolwich Green West Lake and Woolwich Green East Lake. The level rise in the stream caused it to break its banks and the excess water to flow into the Woolwich Green East Lake. The level of the stream further increased due to conditions downstream where it converges with the River Kennet. The high levels in the River Kennet prevented the usual flow from the stream into the river, causing the stream to back up and overtop into Woolwich Green East Lake.

14.8 Woolwich Green East Lake and Island Lake are connected by a narrow stream. As the water level in Woolwich Green East Lake rose, as did the level in Island Lake. The additional water caused Island Lake to overtop onto Hanger Road. The flood water flowed south along Hanger Road, towards Sheffield Bottom.

14.9 The culvert that takes flow from Woolwich Green East Lake to Hose Hill Lake was unable to cope with the increased flow from Woolwich Green East Lake, causing it to overtop onto Jaques Lane. The flood water drained off the road into Hose Hill Lake, increasing the level in this lake as well.

14.10 Hose Hill Lake outfalls to Theale Lake via a culvert in the north-east corner. During the flood event the culvert was blocked and thus unable to discharge water into Theale Lake. This resulted in Hose Hill

Lake overtopping onto Deans Copse Road. The water flowed along Deans Copse Road in a westerly direction towards the Fox & Hounds pub.

14.11 Further downstream, the River Kennet/Canal breached near Sheffield Mill, resulting in the adjacent land to the east flooding. This water continued to flow east until it reached Hanger Road, increasing the volume of water flowing south along Hanger Road.

14.12 The floodwater on Hanger Road was unable to drain into Theale Lake due to the camber of the road and a raised bank at the back of the eastern highway verge. The water flowed south towards the roundabout where it converged with the water coming from Deans Copse Road. From this point the water flowed to the north-east, following the lie of the land towards Theale Lake. This flow resulted in flooding to internal areas of Rose Cottage, the Old Bakery and the Fox & Hounds pub.

14.13 A drainage ditch branches off Deans Copse Road to the north-east of the Fox & Hounds pub. This ditch channels flows from the highway towards Theale Lake. During the flood event this ditch was blocked and therefore unable to channel any of the flood water in the area.

14.14 Vehicle movements along Deans Copse Road resulted in bow waves being pushed towards the flooded properties, worsening the extent of the flooding.

Flooding in Burghfield Bridge

14.15 Burghfield Bridge first experienced flooding on Christmas Eve from the Kennet and Avon Canal. The Canal bank was breached at low points and water flowed over the tow path into the floodplain either side of the Canal (refer to drawing 70003227/18/103). As a result the fields west and east of Burghfield Road and in between the Kennet and Avon Canal and Mill Road were flooded. The fields north of the Kennet and Avon Canal, to the west of Burghfield Road, were also flooded.

14.16 Water flowed in the culvert from the field north of Mill Road into the field by Green Lane. From this field, the water flowed east into the adjacent privately owned lake. Historically the water would flow from this lake, through a drainage ditch alongside the canal towpath and back into the watercourse network. Over time this ditch has become silted up and has not been reinstated. In circa 2003 the Canal and River Trust installed a culvert along the line of this ditch in order to allow excess water to flow back into the canal. It is thought this culvert allowed water to flow during the winter 2013-14 flood event; however the capacity of the structure is not known.

14.17 The flooded fields are designated as floodplain; however the overtopping of the Kennet and Avon Canal lead to an uncontrolled amount of water entering the fields, with the excess waters overflowing into the nearby highways and affecting properties.

14.18 Burghfield Bridge has experienced substantial development in recent years. The fields surrounding the village have been raised and some of the gravel extraction lakes have been filled in. These works may have reduced the capacity of the surrounding land to hold excess water.

14.19 Burghfield Road was closed as a result of significant flooding of the highway. The flood water extended along Green Lane, Pingewood Road North and Burghfield Bridge Close. Pingewood Road North was impassable at the junction with Green Lane due to flood water.

14.20 Both the Cunning Man pub and Burghfield Bridge Tyres experienced internal flooding as a result of the flood waters flowing out of the floodplain. Both businesses had to close for approximately one week.

14.21 In addition to the Cunning Man pub and Burghfield Bridge Tyres, three distinct areas of Burghfield Bridge experienced flooding during the winter 2013-14 event; Burghfield Bridge Close and Pingewood Road North; Moatlands Cottages; and Holybrook Farm Cottages.

Burghfield Bridge Close and Pingewood Road North

14.22 Groundwater emerged in the field opposite the entrance to Burghfield Bridge Close in the second week of February (refer to drawing 70003227/18/103). Burghfield Bridge Close is situated at a lower level than this field and Burghfield Road. It is thought groundwater ingressed the surface water sewer system in Burghfield Bridge Close as the system was at full capacity during a time of no rainfall. Water surcharged from a gulley close to N^{o}. 2 Burghfield Bridge Close, which is the lowest lying property in the estate, and pooled in the low point outside the front of the property.

14.23 This water flooded internal areas of N^{o}. 2 Burghfield Bridge Close on the 12th February. A few days prior to this the owner of the property pumped water from within the vicinity of the property in an effort to prevent internal areas of the property from flooding. The pumping was not sufficient to keep the water from entering the property. N^{o}.1 Burghfield Bridge Close also suffered flooding to internal areas of the property as a result of this groundwater emergence. The depth of flooding to these properties is not known.

14.24 Further south, along Pingewood Road North, Stillwaters experienced flooding to internal areas of the property around the 12th February. The property was flooded as a result of the lake to the rear of the property overtopping. The lakes in this area were unable to cope with the significant additional volume of water overtopping from the Kennet and Avon Canal.

14.25 The lakes overtopping also caused flooding to large extents of Berry Lane, resulting in the closure of the road.

Moatlands Cottages

14.26 High levels in the River Kennet and the Kennet and Avon Canal also resulted in the lakes to the west of the village overtopping in late December.

14.27 The four cottages that make up Moatlands Cottages are located at the end of Mill Road (refer to drawing 70003227/18/102, with open fields and lakes to the west, north and east. The M4 is located immediately south of the properties, with a service area to the south-east. The only access to the cottages by car is via Mill Road. The properties can be accessed informally by foot from the M4 Service Area.

14.28 On Christmas Eve water from these lakes flooded the external areas of Moatlands Cottages to a depth of approximately 75mm. Although the water level reached N^{o}.s 3 and 4, none of the four cottages experienced flooding to internal areas. All four properties are served by sceptic tanks, which suffered ingress of floodwater resulting in flooding to external areas from sewage water as well as fluvial water. The flood water receded within 12 hours.

14.29 In late January and early February the levels in the lakes began to rise again.

14.30 During the night of the 8th February cottages 3 and 4 experienced groundwater rising up through the floorboards to a depth of 175mm. The residents of the two properties evacuated at 3am. Cottages 1 and 2 did not suffer flooding to internal areas of the properties and therefore did not evacuate the properties.

14.31 When residents evacuated the flood water on the road was approximately 1m deep in the worst affected area. The majority of the road was flooded to a depth of approximately 300mm. When residents attempted to return to the properties the following day, the road was still impassable and the only way to access the properties was on foot via the M4 service area. West Berkshire Council provided supplies to N^{o}. 1 and 2.

14.32 Mill Road typically floods to a depth of approximately 200mm following heavy rainfall events (typically 5 to 6 hours of rainfall).

14.33 Flood water also collected in the eastern half of Dewe Lane, but none of the properties were affected.

14.34 Directly to the north of Burghfield Mill an outlet is designed to flow out of the canal, under the towpath and along a channel through the fields to the south. This outlet is engineered to allow excess flow to leave the canal and drain via the adjacent fields. During the flood event, this outlet was observed to be clear of obstructions, allowing a significant volume of water to pass through.

Holybrook Farm Cottages

14.35 In early January the fields between Holybrook Farm Cottages and the Kennet and Avon Canal flooded (refer to drawing 70003227/18/103). This flood water extended out of the floodplain, to the north of the cottages and farm buildings, flooding the gardens and external areas associated with the properties.

14.36 Flood water extended up the external walls of the three properties. This water was initially prevented from entering internal areas of Holybrook Farm House by pre-installed flood boards on the doors of the property. As the water level rose, water entered internal areas of the property via the skirting boards, suggesting water either rose up through the floor or seeped in through the brickwork. The property was flooded internally to a depth of 50mm. Two privately owned pumps were installed in an effort to prevent the water level from rising.

14.37 The White Cottage and the Bungalow did not have pre-installed flood boards and suffered flooding to internal areas of the properties via the doors and air bricks.

14.38 A number of the farm buildings associated with Holybrook Farm were also flooded internally.

14.39 Flood water normally flows from the floodplain through the culvert beneath Burghfield Road, located approximately 30m south of Holybrook Farm Cottages. The water then flows into the fields on the eastern side of Burghfield Road. Water was observed to be flowing unobstructed through the culvert during the flood event.

Flooding in Pingewood

14.40 The area to the north-west of Pingewood is covered by a number of sizeable lakes. The River Kennet/Canal flows to the north of these lakes (refer to drawing 70003227/18/104).

14.41 The area of Pingewood is divided into three distinct drainage catchments. A topographical high point runs from the River Kennet/Canal in a south-easterly direction to the Scottish & Southern Electric (SSE) Sub-Station, dividing the lakes to the north-west of Pingewood into two catchments. The catchment to the north of the topographical high point drains to a drainage ditch north of the sub-station, which channels water back into the River Kennet/Canal. To the south water drains from the lakes via a drainage ditch, located to the south of the sub-station. This drainage ditch flows into the Foudry Brook, which discharges into the River Kennet/Canal.

14.42 Berry Lane is also a high point, forming a third catchment between the Berry Lane and the M4.

14.43 During the winter of 2012-13 the River Kennet/Canal breached just east of Burghfield Bridge, washing out a section of bank to form a channel approximately 450mm deep. This breach was not repaired between winter 2012-13 and winter 2013-14 as water did not flow out of bank during normal flow conditions.

14.44 During the winter of 2013-14 the high level of water in the River Kennet/Canal meant water flowed out of bank at this former breach location, This breach resulted in a significantly higher volume of water

flowing into the catchment than it typically has to cope with. The drainage ditch which channels overflow waters from this catchment is able to adequately deal with heavy rainfall events and this catchment only floods if the river overtops to the west of the topographic high point. During the flood event the additional water in the catchment caused the lakes to overtop and a significant volume of water flowed towards Kirtons Farm Road.

14.45 Flint Lake is situated at the lowest point in the catchment, with the drainage ditch flowing east from this lake. The drainage ditch was unable to channel all the excess water from the lakes, causing Flint Lake to overtop into Englefield Lake.

14.46 The culvert beneath Cottage Lane was unable to cope with the volume of water in the ditch, resulting in water spilling out of the channel onto the lane. This water combined with flood water on Kirtons Farm Road. The channel also came out of bank by the culvert beneath the railway as a result of debris and rubbish in the culvert limiting the capacity. The volume of water in the ditch also contributed to flooding of the retail park. Three of the shops within the retail area experienced flooding to internal areas.

14.47 A bund has been constructed on the southern side of the ditch along the extent of the channel to the west of Green Park. This bund is located on the wrong side of the channel and therefore does not serve to prevent flooding.

14.48 The rising level in Englefield Lake resulted in water overtopping the eastern and southern banks and flowing onto Kirtons Farm Road and Berry Lane. The water flowed across Berry Lane into Pingewood Lake. The water on Kirtons Farm Road flowed to the north-east, towards Kirtons Farm Cottages.

14.49 No.s 1 and 2 Kirtons Farm Cottages experienced external flooding within the grounds of the properties. The flood water initially surrounded the northern and eastern walls of the cottages, as a result of flows from Cottage Lane. As the water levels in the surrounding area rose the water completely surrounded the cottages.

14.50 No. 2 Kirtons Farm Cottages first experienced internal flooding on the 11th January. The ground floor of the property is arranged over three levels, with the lowest level situated at the eastern end of the cottage. In the eastern end the flood water was 450mm deep. The water remained at this depth within this area of the property for 5 weeks.

14.51 The middle section of the cottage was flooded for 24 hours in early February as a result of a bow wave from Kirtons Farm Road. The highest section of the cottage, at the western end, had flood water beneath the floorboards. This water seeped up the walls, damaging the skirting boards and walls to a height of approximately 150mm.

14.52 A pump was installed in the kitchen in the eastern section of the house a few days after the water first ingressed into the property. The pump was on permanently during the 5 weeks in which the property was flooded. A second pump was installed outside the front of the property and a drainage channel was dug along the front of the property in an effort to keep water away from the front doors of the cottage (No. 2 has two front doors).

14.53 No. 1 Kirtons Farm Cottages did not suffer flooding to internal areas of the property as the cottage is situated at a higher level than No. 2 Kirtons Farm Cottages. Flood water flowed beneath the floorboards of No. 1 Kirtons Farm Cottages, causing damage to the floorboards and walls.

14.54 Since the winter 2013-14 flood event No. 2 Kirtons Farm Cottages has installed a waterproof membrane round the property and formalised the drainage channel at the front of the property, dug during the flood event. No. 1 Kirtons Farm Cottages plans to replace the flooring with concrete to prevent water from flowing beneath the property in the future.

14.55 The Army temporarily repaired the breach in the River Kennet/Canal on the 9th February with a substantial sandbag wall. This wall significantly reduced the volume of water exiting the River

Kennet/Canal and thus reduced the flooding to the properties on Kirtons Farm Road. Within 3 hours of the sandbag wall having been constructed the water level in No. 2 Kirtons Farm Cottages reduced significantly. Within 3 days of the wall being built all the flood water had drained from the property, despite the fact that the river levels in the area were still rising.

14.56 Further south on Kirtons Farm Road 2 properties suffered external flooding. The northern property, White Cottage, was affected from flood water flowing south along Kirtons Farm Road. White Cottage pumped the water into the lake to the rear of the property, in an effort to reduce the level of flood water surrounding the property. The second property, to the south of White Cottage, was affected from water overtopping from Pingewood Lake and flowing into the rear garden.

14.57 The SSE Sub-Station was threatened by rising groundwater as opposed to fluvial water overtopping from the lakes. A significant effort was made to protect the site from groundwater flooding, including the installation of 6 pumps and considerable temporary defences.

14.58 The majority of the lakes to the north-west of Pingewood are owned and farmed by the Reading and District Angling Association. It is estimated that this business lost a significant amount of revenue as a result of the winter 2013-14 flood event.

14.59 The Reading Lake Hotel flooded on the 9th February from the hotel lake overtopping. The hotel was closed and evacuated. 28 rooms, the main bar and the restaurant were all flooded to a depth of 150mm. The flood water stayed in the hotel for approximately 2 weeks. The ground floor of the hotel was still unusable in early June, with it anticipated that the hotel will be unable to use the affected rooms until autumn 2014.

14.60 The external areas of the hotel were flooded to a depth of 450mm, with water from the hotel lake up against the hotel walls. The car parks were all flooded. The flood water remained within the vicinity of the hotel for approximately 5 weeks.

14.61 The hotel is served by a sceptic tank system, with the water being treated on site and then discharged to a reed bed before flowing into the hotel lake. The sceptic system was not flooded, however use of toilets, showers, laundry facilities etc. was limited by the knock on affect their use would have on the levels in the lake.

14.62 The hotel lake was fed by water overflowing from Pingewood Lake. This additional water increased the level in the hotel lake, as the hotel lake does not have an outfall. There used to be a drainage ditch in the field to the south of Kirtons Farm Road which followed the line of the road. This ditch passed beneath the railway, Kirtons Farm Road and Long Avenue to discharge into Green Park. It is understood that this drain used to serve as an outfall for the lake.

West Berkshire Council Emergency Response

14.63 West Berkshire Council provided sandbags to properties at risk of flooding.

14.64 Burghfield Road, Mill Road, Berry Lane and Kirtons Farm Road were closed.

14.65 West Berkshire Council jetted the highway drainage system and cleared the gullies at Burghfield Bridge.

14.66 Grips were cut in Berry Lane to allow the water to flow into Burghfield Lake, clearing the volume of water collecting on the highway.

14.67 The bollard at the junction of Pingewood Road North and Berry Lane was removed, to provide access to residents in Pingewood Road North as the road was inaccessible from the north due to flood water at the junction with Green Lane.

14.68 West Berkshire Council provided flood supplies to the residents of No. 1 and 2 Moatlands Cottages as Mill Road was impassable due to flood water.

14.69 The residents of Pingewood struggled to get a definitive answer from West Berkshire Council as to whether the breach in the River Kennet/Canal would be sandbagged prior to the water overtopping. Residents began communicating with the Council 5 days prior to water coming out of bank, providing warning that the levels were rising. Residents were happy to sandbag the area themselves, but were unsure whether to act as they were not clear on the action West Berkshire Council was planning to take.

Risk Management Authorities

14.69.1 In addition to West Berkshire Council, the following Risk Management Authorities have relevant, flood risk management functions in Burghfield:

- Environment Agency

Environment Agency

14.70 A Fluvial Flood Alert was issued for the River Kennet from Thatcham to Reading on the 23rd December and removed on the 28th December. A second Fluvial Flood Alert was issued for this extent of the Kennet on the 2nd January and removed on the 17th March.

14.71 West Berkshire Council has not been made aware of any further action taken by the Environment Agency.

Recommendations

14.72 In order to reduce the risk of flooding in Burghfield the following measures should be considered:

Maintenance

14.73 The land drainage ditches alongside Mill Road in Burghfield Bridge need to be regularly cleared of silt and debris to ensure surface water runoff is able to effectively drain off the land and to reduce the risk of the highway flooding.

14.74 The land drainage ditches within Sheffield Bottom require regular maintenance, particularly the ditch that runs alongside the Fox & Hounds pub. The ditch was found to be badly choked with vegetation during the flood event.

14.75 The capacity of the culverts between the various lakes in the parish should be checked to ensure there is adequacy to transport flood water between lakes.

Minor Works

14.76 The level of the access gate into the field between Burghfield Road and Green Lane should be raised to increase the volume of water held in this field and reduce the likelihood of the water overtopping the fields and spilling onto Green Lane. These works would reduce the risk of highway flooding in the vicinity of Burghfield Bridge, as well as lessening the flood risk to properties and businesses in the area.

Major Works

14.77 The canal overtopped the tow path in a number of locations along the bend north of Burghfield Mill. The bank level should be raised in this location to limit the water entering the floodplain to that flowing through the designated outlet. These works would increase the level of control over water entering the floodplain and remove the risk to pedestrians from water flowing across the towpath.

14.78 The Burghfield Farm fields, to the south of the canal, and the field north of Green Lane could be excavated to increase the capacity of the floodplain. This will reduce the volume of water overflowing from the floodplain and decrease the risk of flooding properties.

14.79 The breach in the River Kennet/Canal to the north-west of Pingewood should be repaired to ensure the watercourse does not breach at this location in the future and to prevent a significant increase in flood water entering Burghfield, Flint and Englefield Lakes.

14.80 An investigation should be undertaken to determine whether the ditch from the Reading Lake Hotel lake could be reinstated as an outlet from the lake. This outlet would need to be situated below the level of the ground floor of the hotel to reduce the future risk of flooding to the hotel. If the investigation finds these works to be feasible, the ditch should be re-established as a priority.

14.81 In Sheffield Bottom, the possibility of installing a new drainage feature to channel water from Hanger Road to Theale Lake should be investigated. For example, a swale could be installed along the side of the road, with an outlet into the lake.

Other Works

14.82 The overtopping of the canal banks into Holybrook Farm fields needs to be addressed to reduce the flood risk to the Holybrook Farm Cottages. It is understood that the floodplain provided by these fields protects areas downstream in Pingewood. It is recommended that an investigation be undertaken to determine suitable works to ensure the flood risk to both areas is minimised.

14.83 In Burghfield Bridge, the culvert leading from the Green Lane lake to the canal needs to be investigated to determine the condition of the culvert and whether works can be undertaken to increase its capacity.

14.84 An investigation into the flooding of Mill Road in Burghfield Bridge needs to be undertaken to determine the options for alleviating the flooding along this critical access road.

15 Padworth

15.1 Introduction

15.1.1 The Parish of Padworth is located in the south-east of West Berkshire in the River Kennet valley. The parish is bordered by Ufton Nervet to the east, Beenham to the north and Aldermaston to the west. The River Kennet and the Kennet and Avon Canal flow west to east across the north of the Parish. The A4 Bath Road, connecting Thatcham and Reading, runs along the northern boundary of the Parish.

15.1.2 The Parish is mainly comprised of meadows, arable fields, worked gravel pits and patches of woodland. Aldermaston Wharf is located in the north-west of the parish in Mortimer Ward, and is the main populated area (shared with Aldermaston and Sulhamstead Ward).

15.1.3 In the winter of 2013-14 the flooding and associated issues in the Parish were confined to a small number of residential properties in Lower Padworth, specifically in Oak End Way, and Pineland Mobile Home Park. Pineland Mobile Home Park is located in Beenham Parish, but is included in this report due to the nature of flooding affecting this area.

15.1.4 Oak End Way is located directly off the A340 Basingstoke Road and approximately 50m from the roundabout where the A4 Bath Road and the A340 Basingstoke Road meet. The properties are located approximately 3m lower than the roundabout and the A340 Basingstoke Road. The Reading to Exeter main railway line passes to the south of the properties.

15.1.5 Pineland Mobile Home Park is located to the north of the A4 Bath Road, approximately 200m from the roundabout with the A340 Basingstoke Road.

15.1.6 Four properties in the Parish suffered flooding to internal and external areas. Drawing N^{o}. 70003227/15/101 identifies the flooded properties, the approximate flood extents and the directions overland flows took through the area.

15.2 Flooding in Padworth

15.2.1 Oak End Way experienced flooding on two separate occasions; the 4/5th and 28th February. The first flood event was primarily due to the saturated nature of the ground in the area, resulting in surface water runoff from fields to the north and the nearby roads. The foul sewer system also became inundated and blocked, meaning residents were unable to use waste pipes and toilets until Thames Water undertook clearance of the system. It is thought the foul sewer system was filled as a result of both groundwater ingress and surface water runoff entering the network. On the 28th February, the properties suffered flooding from the sewer system surcharging, which was again thought to have resulted from groundwater ingress and surface water runoff entering the system.

15.2.2 The four properties affected in Oak End Way - Cornerways, Cia, Seven Springs and Two Ways - are located at the entrance to the close, facing the A340 Basingstoke Road.

15.2.3 Pineland Mobile Home Park was affected on the 4/5th February.

15.2.4 It is understood that the majority of surface water runoff from this area enters the foul water sewer system. The exact mechanisms of how the foul water from the area is drained are uncertain as Thames Water does not have accurate records of the location of the foul water pipes in the area.

15.2.5 Surface water runoff from Oak End Way is thought to be dealt with by a number of soakaways installed when the properties were built. However, the location of these soakaways is unknown and the residents believe they are not functioning effectively, if at all.

4/5th February

15.2.6 Cornerways, Cia, Seven Springs and Two Ways first experienced flooding to gardens on the 4/5th February as a result of surface water runoff from the nearby highways and fields.

15.2.7 Flood water collected in the front and rear gardens of the four properties. On the 7th February, the flood water was inches from entering the properties. The water level outside of the properties varied from between 50mm and 300mm for approximately 2 weeks.

15.2.8 The four flooded properties were unable to use their waste pipes and toilets for approximately 2 weeks from the 5th February. The properties further south on Oak End Way continued to use their toilets and showers, which may have contributed to the lack of capacity elsewhere in the sewer network. The affected properties were able to start using their toilets again after Thames Water cleared the sewer system.

15.2.9 The Pineland Mobile Home Park reported that residents were unable to use facilities due to the foul sewer system being at capacity on the 4/5th February. Thames Water visited the site and confirmed that the foul system was at capacity due to groundwater ingress. Thames Water sandbagged around the points at which the system was anticipated to surcharge. Thames Water tankered water from the foul network at Pineland Mobile Home Park on the 7th February. This tankering reduced the level in the network and alleviated the risk of the system surcharging.

15.2.10 Additionally, Padworth Lane was flooded as a result of surface water runoff from the nearby fields. It is thought surface water runoff was exacerbated by high groundwater levels in the area.

28th February

15.2.11 At 5am in the morning of the 28th February Padworth suffered a power cut, which resulted in the Thames Water pumping station east of Lower Padworth, at Macs Cafe, along the A4 Bath Road, cutting out. Thames Water pump water west to east through the network. The pumping station to the west, at Aldermaston Wharf, was not affected by the power cut and continued pumping. Water was therefore being pumped from Aldermaston Wharf but not being pumped on from Padworth.

15.2.12 As a result effluent surcharged from the foul drains connected to Seven Springs and Cia. These drains are connected to the foul sewer manhole in the driveway of Two Ways, which receives sewerage from the Aldermaston Wharf pumping station.

15.2.13 The four affected properties in Oak End Way first experienced internal flooding mid-morning on the 28th February. These properties had water in internal areas until the pumps at the pumping station at Macs Café were manually restarted in the late afternoon of the 28th February. These pumps were only restarted as a result of calls from residents to alert Thames Water to the problems.

15.2.14 Seven Springs suffered flooding to internal areas of the property to a depth of 50mm as a result of foul water flowing into the property via the conservatory doors. Flood water also flowed beneath the floorboards of the property, and seeped up the walls, causing further damage.

15.2.15 Both Cia and Cornerways experienced internal flooding as a result of water flowing beneath the floorboards and seeping up the walls. The flood water beneath the floor boards in Cornerways resulted in the electricity supply to the property being cut off.

15.2.16 Two Ways experienced internal flooding as a result of water flowing into the property via doorways and air bricks. The water was prevented from flowing beneath the property as the owners filled the void beneath the floorboards with concrete following the July 2007 flood event, in an effort to prevent internal flooding of the property.

15.2.17 The gardens of Seven Springs, Cia and Two Ways were flooded with foul water.

15.2.18 The residents of Oak End Way complained of intermittent sewer smells (hydrogen sulphide gas) in the area, likely to have resulted from the stop start nature of the pumping at Aldermaston Wharf. Thames Water have indicated that equipment is being considered to remove these smells from the system at Aldermaston Wharf.

15.2.19 The four properties affected in Oak End Way were all previously flooded during the July 2007 event. As a result of this event, the Environment Agency provided these properties with Property Level Protection funding in autumn 2013. The properties have been surveyed, but the measures were not installed prior to the winter 2013-14 flood event. It is anticipated that Property Level Protection measures will be installed in these properties in summer/autumn 2014.

15.2.20 West Berkshire Council redesigned the highway drainage system following the July 2007 event. The new system holds back the majority of the runoff from the highway, but surface water still flows towards the properties during peak events.

15.3 West Berkshire Council Emergency Response

15.3.1 West Berkshire Council provided sandbags to the properties in Oak End Way prior to the 28th February.

15.3.2 Portable toilet units were not provided at Oak End Way or Pineland Mobile Home Park.

15.4 Risk Management Authorities

15.4.1 In addition to West Berkshire Council, the following Risk Management Authorities have relevant, flood risk management functions in Padworth:

- Environment Agency
- Thames Water

Environment Agency

15.4.2 West Berkshire Council has not been made aware of any action taken by the Environment Agency.

Thames Water

15.4.3 Thames Water cleared and cleaned areas affected by sewage. The residents in Oak End Way undertook a lot of the sewage clean-up themselves due to a delay in the response from Thames Water.

15.4.4 Thames Water provided sandbags to Pineland Mobile Home Park and tankered water from the foul network to alleviate the risk of the system surcharging in the mobile home park.

15.4.5 West Berkshire Council has not been made aware of any further action taken by Thames Water.

15.5 Recommendations

15.5.1 In order to reduce the risk of flooding in Padworth the following measures should be considered:

Maintenance

15.5.2 The highway drainage system should continue to be regularly maintained to ensure the maximum volume of surface water runoff is channelled through the system and does not flow towards the properties in Oak End Way.

The potential for a drainage route through to the railway should be investigated. This may have been present before the houses were built but since forgotten and fallen in to disrepair. Should a drainage route have existed the potential to re-instate it should be considered.

Minor Works

15.5.3 The four affected properties in Oak End Way have been granted Environment Agency funding for Property Level Protection. These works are anticipated to include a mixture of new sealed doors, flood gates, air brick covers, re-pointing of brickwork and non-return valves on the foul water drains connected to the Thames Water foul sewers in the area. It is anticipated the associated works to the properties will be undertaken in summer/autumn 2014.

15.5.4 Thames Water could consider installing a telemetry system for the pumping stations in this area of West Berkshire to ensure operations are better coordinated. Furthermore Thames Water would be able to use this system to remotely shut down the Aldermaston Wharf Pumping Station if the Padworth Station fails to help spread the foul flooding problem rather than concentrate it to one area.

15.5.5 Thames Water has indicated that they are considering undertaking a CCTV inspection of the whole sewer network from Aldermaston Wharf to the sewerage works at Theale. The location of the network along the railway line requires the cooperation of the Network Rail sewer team. It is strongly recommended that Thames Water undertake this CCTV survey and undertake any repair works necessary.

15.5.6 West Berkshire Council should investigate the alignment of the outlet pipe which discharges from the surface water ditch located along the north kerb of the A4, west of the A340 roundabout. West Berkshire Council should also establish whether the effluent and surface runoff from the Porshe warehouse, located to the north-west of the A340 roundabout, is directed to the Oak End Way drainage system.

16 Hamstead Marshall

16.1 Introduction

16.1.1 Hamstead Marshall Parish is located to the south-west of Newbury, along the southern boundary of West Berkshire. The Parishes of West Woodhay, Kintbury, Welford, Speen and Enborne border the Parish. The Kennet & Avon Canal and the River Kennet both flow west to east close to the northern border of the Parish and the River Enborne flows from west to east along the southern boundary of the Parish.

16.1.2 Hamstead Marshall village is located in the southern half of the Parish. The village is surrounded by open agricultural land and woodland.

16.1.3 In the winter of 2013-14 the Parish experienced highway flooding in a number of locations as a result of surface water runoff from high volumes of rainfall.

16.1.4 One property within Hamstead Marshall village suffered flooding to internal areas of the property, with an additional property suffering external flooding. Park Lane, Skinner's Green Lane, Holtwood Road and Ash Tree Grove were all flooded to varying degrees within Hamstead Marshall. Drawing N^{o}. 70003227/16/101 and 16/102 identify the flooded properties, the approximate flood extents and the directions overland flows took through the village.

16.1.5 This report also details two incidences of highway flooding just outside of the Hamstead Marshall parish border, in Enborne and Kintbury.

16.2 Flooding in Hamstead Marshall

Ash Tree Grove

16.2.1 On the 30th April Ash Tree Grove was affected by overland flow from Holtwood Road. Holtwood Road slopes from south to north and Ash Tree Grove falls to the north-west.

16.2.2 The water flowing along Holtwood Road was made up of surface water runoff from the surrounding fields and woodlands, including Hall's Copse and Redhill Wood. The water therefore contained a significant amount of gravel, silt and debris.

16.2.3 During the winter 2013-14 flood event, since the level at the junction of Ash Tree Grove and Holtwood Road was almost the same, meaning the water was able to freely flow into Ash Tree Grove. Water was also able to flow into Ash Tree Grove as a result of a 300mm gap between the southern kerb and the main road surface, which formed a slightly lower channel for the water to flow in.

16.2.4 The water flowed down Ash Tree Grove in a north-westerly direction, collecting in the parking area in front of N^{o}.s 7, 8 and 9. The water initially collected against the kerb of the parking area, but as the flood level continued to rise, water overtopped the kerb and flowed towards the fronts of No. 8 and 9, before flowing to the west, around the side of No. 9. The water then flowed into the fields immediately west of Ash Tree Grove.

16.2.5 The flood water flowing at the front of No.s 8 and 9, against the walls of the properties was approximately 300mm deep and was of sufficient volume and speed to uproot the plants and carry the topsoil from the flower beds.

16.2.6 No. 8 Ash Tree Grove was the only property to experience flooding to its internal areas as a result of the overland flow. The water flowed into the property through the front door, flooding approximately 3m of the hallway to a depth of 25mm.

16.2.7 No. 9 Ash Tree Grove experienced external flooding at the front and side of the property. The entrance to this property is situated on the southern side. The flood water rose to the edge of the step at the entrance to the property, but did not enter the house.

16.2.8 Two of the highway drains in Ash Tree Grove were noted to be blocked with silt and debris prior to the flood event; one to the south-east, near to the junction with Holtwood Road, and one in the north-west

corner of the parking area. These drains did not allow any water to flow away, increasing the volume of water on the carriageway and around the properties.

16.2.9 Sovereign Housing Association supplied sandbags to the properties. These were built up outside the front of No.s 8 and 9 in an effort to prevent the water entering the houses. The sandbags served to hold back some of the flood water, but were not totally adequate overall.

16.2.10 West Berkshire Council sandbagged the junction of Ash Tree Grove and Holtwood Road in an attempt to prevent additional water flowing into Ash Tree Grove and worsening the flooding.

16.2.11 None of the other properties in Ash Tree Grove were affected by the flood water.

16.2.12 Since the flood event at the end of April, the West Berkshire Council Highways Team has raised the concrete sets at the junction of Ash Tree Grove and Holtwood Road in an attempt to prevent surface water runoff on Holtwood Road flowing into Ash Tree Grove. Since these works have been done there has not been a significant rainfall event to test whether the works will reduce the risk of flooding to Ash Tree Grove.

Park Lane

16.2.13 The culvert beneath Park Lane, which channels water from a land drain beneath the road, was inundated. As a result water spilled out of the culvert onto the road surface, flooding the carriageway to a depth of approximately 600mm. The road was passable and was not closed.

Skinner's Green Lane

16.2.14 Skinner's Green Lane is located beyond the boundary of Hamstead Marshall parish, within the parish of Enborne.

16.2.15 Skinner's Green Lane was flooded in two places. Firstly a significant extent was flooded east from Spicer's Copse as a result of surface water collecting on the highway.

16.2.16 Secondly, further east along Skinner's Green Lane, in Enborne, the road was flooded as a result of the lack of capacity in a culvert beneath the road. The culvert serves a land drain which lows from south to north, perpendicular to the road. The road was flooded for approximately 2 months and was only passable in larger vehicles such as 4x4s. This road is one of the main access routes to Enborne C of E Primary School.

16.2.17 Since the winter 2013-14 flood event, West Berkshire Council have cleared and re-profiled the ditch that runs parallel to the south side of the road. A new larger culvert has been installed and the road has been re-surfaced, raising the level in an effort to reduce the depth of flooding in the future.

Kintbury Holt Farm

16.2.18 This area is located beyond the boundary of Hamstead Marshall parish, within the parish of Kintbury.

16.2.19 The pond to the west of the road by Kintbury Holt Farm overtopped during the winter 2013-14 flood event, flooding out into the field to the south and across the road. The water on the carriageway was approximately 900mm deep. The road was closed following an incident where a car became stuck in the flood water.

16.3 West Berkshire Council Emergency Response

16.3.1 West Berkshire Council sandbagged the junction of Ash Tree Grove and Holtwood Road in an attempt to prevent additional water flowing towards the properties in Ash Tree Grove.

16.3.2 The road by Kintbury Holt Farm was closed.

16.4 Recommendations

16.4.1 In order to reduce the risk of flooding in Hamstead Marshall the following measures should be considered:

Maintenance

16.4.2 Ditches and ordinary watercourses in the parish need to be regularly cleared of silt and debris to ensure surface water runoff is able to effectively drain off the land. This is also important to ensure that culverts do not become blocked or have their capacity reduced as a result of debris flowing in ditches and ordinary watercourses.

Major Works

16.4.3 The feasibility of constructing a diversion channel round the properties in Ash Tree Grove should be investigated to determine if such a feature could be used to divert the flow from Holtwood Road and help alleviate the risk to these properties.

16.4.4 The possibility of installing ponds or shallow depressions along ditches and ordinary watercourses should be investigated. These features would serve to reduce the velocity of the water before it reaches the roads, encouraging sediments to fall out of suspension before they reach the road drain, ensuring the road drains are not so easily and quickly blocked.

16.4.5 The capacity in the culvert beneath Park Lane should be investigated to determine if it is sufficient to deal with high volumes of flow similar to those experienced during the winter 2013-14 flood event. The culvert should be replaced with a larger culvert if the investigation concludes that the capacity is currently insufficient.

16.4.6 The possibility of increasing the capacity of the Kintbury Holt Farm pond should be investigated to determine if additional flood waters can be held in the pond as opposed to flooding the road.

17 Streatley

17.1 Introduction

17.1.1 Streatley Parish is located in the north-east corner of the County, with the northern and eastern boundaries bordering Oxfordshire. The River Thames is located along the eastern boundary of the Parish, with the town of Goring located on the opposite bank of the Thames.

17.1.2 The main populated area of the Parish is Streatley village, which is located to the east of the parish, alongside the River Thames. The village is surrounded by open agricultural land and woodland. The topography of the village falls from west to east, with the land to the west of the village falling steeply down to the river.

17.1.3 In the winter of 2013-14 the village of Streatley experienced flooding as a result of three primary sources: the River Thames, high groundwater and resulting overland flow and foul sewage water. These sources combined to cause significant flooding in the village.

17.1.4 Twelve properties within Streatley village suffered flooding to internal areas, with an additional eleven properties suffering external flooding. The cellars of three properties also flooded. Wallingford Road and Reading Road were both closed as a result of flooding on the highway. Drawing N^{o}.s 70003227/17/101 to 17/103 identify the flooded properties, the approximate flood extents and the directions flood flows took through the village.

17.2 Flooding in Streatley

17.2.1 Streatley typically suffers a degree of flooding each winter, but the extent and duration of the flooding varies significantly. The main events to have affected the village in the past 15 years were in 2000/01 (winter); 2003; 2007 (summer) and 2012/13 (winter). The mechanisms that have caused each of these past flood events have been different, resulting in a range of effects from flooding.

17.2.2 In the winter of 2013-14 Streatley was affected by flood water from the River Thames, high groundwater and overland flow and sewers surcharging . The village also experienced a small degree of flooding from surface runoff; however this flooding was localised, only affecting a small section of the village. Through the winter of 2013-14 the village was significantly flooded on three distinct occasions: two weeks before Christmas; 8th/9th January; and 8th February. It is understood that the January event was the only event to cause internal property flooding, bar internal flooding to Cleeve Court during the February flood event. The flood water did not completely recede in between each of the flood events, but the level did drop considerably each time.

River Thames

17.2.3 The River Thames came out of bank at numerous points north of and within the village . As a result, a significant volume of fluvial water flowed through the fields alongside the banks of the river, affecting a number of properties.

17.2.4 This flood water caused significant damage to agricultural land up to the Streatley parish/Oxfordshire border.

17.2.5 Additional flood water from groundwater-fed overland flow contributed to this fluvial flood water, increasing the volume of water and extent of the flooding.

17.2.6 To the north of the village Cleeve Court was badly affected by both fluvial water from the Thames and groundwater-fed overland flow from the fields to the north-west during both the January and February

events. Cleeve Court comprises eleven properties arranged in two blocks, plus a separate, detached residence called Cleeve House. Ten out of the eleven properties experienced flooding to internal areas, including Cleeve House. The only property not affected was N^{o}. 7, which had recently had a number of flood protection measures fitted, including the installation of a pumping system and waterproof membranes in the lower level rooms. These flood protection works are due to be installed on the remaining ten properties in Cleeve Court in the coming months.

17.2.7 The area surrounding Cleeve Court was completely inundated with flood water during both the January and February events. The properties could only be accessed by walking through waist high flood water, areas of which had a strong current. The area was inaccessible by car and residents had to park their cars to the east along the access road.

17.2.8 The flood water receded between the January and February events and the properties at Cleeve Court dried out during the interim period.

17.2.9 The drains which enter and exit the inlet associated with Cleeve Court were badly silted and vegetated prior to the flood event. The main channel which connects this inlet to the River Thames is completely clear and used by craft moored in the inlet.

17.2.10 South-west of Cleeve Court, a combination of fluvial water from the River Thames and groundwater fed overland flow caused flooding to Cleeve Court Cottage, the Lodge, Chaddleworth and Garden Cottage. Water from the field to the north of Cleeve Court Cottage completely surrounded both Cleeve Court Cottage and The Lodge. Despite the extensive external flooding in the grounds of these properties, neither house suffered flooding to internal areas of the property.

17.2.11 In an effort to reduce flood risk to these properties in the future, a new drainage ditch will be constructed along the western boundary of Cleeve Court Cottage, which will feed into the existing ditch along the western boundary of The Lodge. The ditch along the western boundary of The Lodge feeds into a small pond in the south-west corner of The Lodge. Currently a pipe channels water from the pond, beneath the road into the field to the east. This pipe is badly silted and blocked and will be replaced with a new pipe in the summer of 2014. The drainage ditch in the field to the west will also be re-profiled to increase the capacity and re-formalise this channel.

17.2.12 The external grounds of Chaddleworth were also completely covered by flood water and the house was surrounded to a depth of approximately 450mm. The flood water did not enter internal areas of the house, but the water was only a few millimetres from the threshold level of the front door. The owners of Chaddleworth are in the process of constructing a drainage ditch to the east of the property, to channel flood water south, to join the re-profiled drainage ditch in the field to the south, which will then discharge to the Thames.

17.2.13 A considerable volume of water surrounded Garden Cottage. A small amount of water entered the internal porch of the property and flooded this area to a depth of approximately 50mm.

17.2.14 South of these properties, the flood water flowed south through the grounds of the Swan Hotel. The flood water also inundated external areas associated with the Swan Hotel, including the car park and the formal gardens on the eastern side of the hotel. External areas of the hotel were flooded two weeks before Christmas, on the 8th and 9th January and the 9th February. This flood water rose to approximately 900mm along the terrace. On the 8th and 9th January the flood water entered the hotel, flooding the Lounge area to a depth of approximately 75mm.

17.2.15 The flood water came within close proximity of the Streatley Sewage Treatment Works. The Sewage Treatment Works are situated at a relatively low level and were at significant risk of flooding during the winter 2013-14 event. It is believed that Thames Water did not take any action to prevent the Sewage Treatment Works from flooding.

17.2.16 To the south of the High Street, a number of properties along Vicarage Lane experienced external flooding within the grounds of the property, including Mill House, Mill Stream House, Windrush, the Old Vicarage and Southfields. The extent to which these properties experienced external flooding is not known. It is also unknown as to whether these houses suffered flooding to their internal areas.

17.2.17 Streatley residents understand that the volume of water breaching the banks along this stretch of the Thames during the flood event was greater than it may otherwise have been as a result of the significant number of fallen trees and debris in the river itself. Residents also believe the river bed to be badly silted, which is thought to have reduced the capacity of the channel during the flood event.

17.2.18 The distance between the two locks on this stretch of the river is relatively short in comparison with other stretches between locks (pounds). It is not known whether this may have exacerbated the effects of the flooding.

17.2.19 Access to the village became restricted for a time, with both the Wallingford Road to the north and the Reading Road to the south closed as a result of flood water on the highway. Groundwater emerged alongside the Wallingford Road and flooded areas of the highway. Reading Road was closed near Basildon Park, as the water was exceedingly deep at a number of points along the road.

Groundwater and sewage

17.2.20 During the winter 2013-14 flood event groundwater levels in the vicinity of the village were high from November to April. These high levels resulted in significant overland flow running down into the village from the hills to the west.

17.2.21 The main problems from groundwater flooding in the village were concentrated in the vicinity of the Village Hall and the Church. High groundwater levels in the field immediately west of the Church resulted in a combination of groundwater and overland flow saturating this field.

17.2.22 A Thames Water foul water sewer flows beneath this field, channelling foul water from the western part of the village to the sewage treatment works. Groundwater ingress into this pipe resulted in sewage water surcharging from the system in this field.

17.2.23 Sewage water and overland flow combined and flowed north-east from the field, towards the Swan Hotel and the River Thames. This water flowed from the field through the flint wall, which forms the eastern boundary of the field, causing significant damage to the wall. The nature of the flow through the wall meant it was not possible to divert or control this flood water.

17.2.24 The cellars of the Village Hall, the Church and Childe Court all flooded as a result of the high groundwater levels. Childe Court pumped water from the cellar to the High Street in an attempt to reduce the level of water in the property. It is not known whether this pumping prevented the water in the cellar flooding the living accommodation.

17.2.25 Along Church Lane N^{o}. 1 and 2 Church Croft Cottages experienced flooding to their grounds as a result of the groundwater and sewage water flowing from the south-west. It is not known whether these houses experienced flooding to internal areas of the property.

17.2.26 Further north, a spring emerged in the field to the north-west of Cleeve Court. This spring has emerged during previous flood events. Water from the spring combined with fluvial water from the Thames and affected Cleeve Court, Cleeve House, Cleeve Court Cottage, the Lodge, Chaddleworth and Garden Cottage.

17.2.27 Groundwater also collected in areas of Cleeve Court, in the vicinity of the driveway, prior to the main flood events.

Surface water runoff

17.2.28 Surface water surcharged from a highway gully on High Street, just west of Childe Court. The surface water runoff flowed west to the River Thames. Some of this water flowed north down the side of Childe Cottage and the Village Hall, combining with the overland flow and sewage water from the field to the west.

17.2.29 A significant volume of surface water runoff was observed flowing into the telecoms pipe behind the Swan. The volume and flow of the water meant residents were unable to divert the flow path. It is unknown where this water flowed to or the damage that it caused.

17.3 West Berkshire Council Emergency Response

17.3.1 Criticism has been made by some residents that West Berkshire Council was initially slow to recognise the flooding in Streatley. Once the issues were acknowledged and understood, the response from the Council was considered to be excellent.

17.3.2 West Berkshire Council provided sandbags. The number of sandbags provided was not sufficient for the number of properties requiring them in Streatley. Residents had to make their own arrangements for additional sandbags.

17.3.3 Wallingford Road and Reading Road were both closed.

17.4 Risk Management Authorities

17.4.1 In addition to West Berkshire Council, the following Risk Management Authorities have relevant, flood risk management functions in Streatley:

- Environment Agency
- Thames Water

Environment Agency

17.4.2 The Environment Agency issued a fluvial Flood Alert for the River Thames at Streatley on the 24th December. This alert was removed on the 9th March. A fluvial Flood Warning was issued for the River Thames at Streatley on the 7th January and removed on the 12th. A second warning was issued on the 8th February and was removed on the 17th February.

17.4.3 On the 7th January the flood event was already taking place when the Environment Agency fluvial Flood Warning was issued. The flooding was still taking place on the 12th January when the Flood Warning was removed. During the February incident the Flood Warning was again issued too late and removed too early.

17.4.4 Environment Agency representatives were present in Streatley during the flood event.

17.4.5 West Berkshire Council has not been made aware of any further action taken by the Environment Agency.

Thames Water

17.4.6 Thames Water responded to some of the calls made by residents in the village, but a number were not dealt with.

17.4.7 Thames Water has committed to undertaking a CCTV survey of the foul sewer network in the field west of the Church to establish whether the system requires work to prevent the system surcharging in the future.

17.4.8 West Berkshire Council has not been made aware of any further action taken by Thames Water.

17.5 Recommendations

17.5.1 In order to reduce the risk of flooding in Streatley the following measures should be considered:

Maintenance

17.5.2 The drainage ditches in the vicinity of the village require regular maintenance, including scrub/vegetation clearance and de-silting. A number of the ditches require re-profiling as they have become badly silted over time. Although maintaining and re-profiling the ditches will not remove the risk of flooding, it may reduce the duration and extent of the flood, especially during a groundwater or surface water flood event.

17.5.3 Major Works

17.5.4 A series of filter drains or swales should be constructed alongside Streatley Hill in an attempt to slow the flow of groundwater fed overland flow from the hills to the west. This would lessen the rate at which groundwater flows into the village and reduce the risk of flooding from this source to the central areas of the village.

17.5.5 A drainage ditch should be dug to divert flood water from the field to the west of the Church around the Swan Hotel to the River Thames. Although this ditch would have been unlikely to alleviate the flooding during the winter 2013-14 flood event, such a feature would help reduce the flood risk during lower magnitude events.

17.5.6 The Streatley Sewage Treatment works requires flood protection such as a bund to ensure the works are not inundated during a future flood event. The flooding of the sewage treatment works would lead to a major pollution incident and protecting these works needs to be considered as a matter of urgency.

17.5.7 The Scottish and Southern Electric sub-station and the Cleeve Court sub-station require protection to ensure the village is not cut-off during a flood event.

17.5.8 Infrastructure improvements are required to protect underground utilities from flood water, such as the telecommunications pipe behind the Swan.

Other Works

17.5.9 Residents noted the important role played by the lock keeper, who informs those whose properties are at risk of flooding from the River Thames when the levels in the river are rising and getting to a critical level. The importance of retaining this lock keeper and not installing a replacement electronic system is paramount.

17.5.10 An investigation should be undertaken to determine locations in the vicinity of the village where springs are likely to emerge in the future. This information can then be used to alleviate the flood risk from emerging springs and prevent development on or near to potential spring locations.

17.5.11 West Berkshire Council to raise the issue of maintenance of the River Thames with the Environment Agency, including the removal of dead trees and vegetation debris and dredging to increase the capacity. Note: if dredging is required it is expected to be only in localised areas around control structures.

18 Pangbourne

18.1 Introduction

18.1.1 Pangbourne Parish is located to the north-east of West Berkshire, with the River Thames located along the northern boundary of the Parish, and the M4 motorway along the southern boundary. The River Pang flows through the east of the Parish and joins the Thames near Pangbourne train station in the north the village. The Sulham Brook flows parallel to the River Pang on the eastern boundary of the Parish and joins the Thames to the east of the village.

18.1.2 The main populated area of the Parish is Pangbourne village, which is located to the north-east, alongside the River Thames. The village is surrounded by open agricultural land and woodland.

18.1.3 In the winter of 2013-14 the Parish and village of Pangbourne experienced flooding as a result of two primary sources: the River Thames; and the River Pang and Sulham Brook. These watercourses affected different areas of the Parish and at different times during the winter.

18.1.4 Four properties within Pangbourne village suffered flooding to internal areas, with an additional twenty properties experiencing external flooding. Mill Lane and Sulham Lane were both closed due to flood water on the highway. Drawing N^{o}. 70003227/18/101 to 18/103 identify the flooded properties, the approximate flood extents and the directions flood water took through the village.

18.2 Flooding in Pangbourne

River Thames

18.2.1 Flood water from the River Thames affected Pangbourne from the 7th January for approximately 1 week and again on the weekend of the 14th and 15th February for approximately 5 days. The water level receded between the two flood events, but did not completely drain from gardens along the river.

18.2.2 During both events the River Thames breached at a number of points along the southern bank, to the south-west of Whitchurch Lock (refer to Drawing 70003227/18/101). Water from the river also rose up through the ground along the southern bank as a result of the permeable soils of the floodplain. These soils provide a subsurface route for flood waters to bypass higher ground along the banks of the river, which would otherwise protect these areas.

18.2.3 Four properties suffered flooding to internal areas as a result of water rising up from the ground; Weirpool, the Boat House, No. 4 Wharf Cottages and the Swan pub. The depth to which these properties flooded internally is not known. The Swan pub had to close as a result of the flood waters inside the property. Weirpool deployed five pumps in an effort to reduce the level of flood water in the property. These pumps were privately owned and operated by the property owner. All four properties also deployed a large number of sandbags to protect from water ingress from the River Thames.

18.2.4 The water coming out of the banks of the River Thames flooded the external areas of a number of properties; Wharf House, the Boathouse Surgery, Bridge Cottage, N^{o}.s 2, 3 & 4 Wharf Cottages, Waterside House, Weirpool, Two Rivers, the Swan and the Boathouse. A number of properties to the east of Whitchurch Road also experienced external flooding; Adventure Dolphin, N^{o}.s 3, 5, 7, 9, 11 Thames Avenue, Rookwood and Killaughy.

18.2.5 Water came out of bank immediately east of Wharf House and flowed along the Wharf footpath. This water flooded the entire garden of Wharf House and the car park of the Boathouse Surgery. The velocity and depth of the flood water made the Wharf footpath inaccessible. Access to the Surgery became difficult as the water levels rose, with wheelchair access impossible as the surgery did not

have any form of flood ramps or walkways. The Surgery is raised above the floodplain and therefore, did not flood internally.

18.2.6 The flood water on the Wharf footpath flowed east to Whitchurch Road and west towards the river. The flood water flowing east flooded external areas of Bridge Cottage. The flood water reached the rear door of the property but did not ingress into the cottage. The water that flowed west flooded the grounds of N^{o}.s 2, 3 & 4 Wharf Cottages. The cottages were only accessible via car due to the depth and velocity of the surrounding floodwaters. Only N^{o}. 4 experienced internal flooding.

18.2.7 This water continued to flow west, flooding external areas of Waterside House. The River Thames came out of bank in front of Waterside House, further increasing the volume of water surrounding the property. The flood water resulted in the house becoming an island, only accessible by four-wheel drive vehicles.

18.2.8 The gardens of Weirpool and Two Rivers were completely flooded by river water. The owner of Weirpool noted that the garden has not flooded in the last 10 years.

18.2.9 The Swan car park was completely flooded. The Boathouse was also flooded both internally and externally as a result of rising groundwater.

18.2.10 The car park of Adventure Dolphin was completely inundated. The use of sandbags prevented internal areas of the building from flooding.

18.2.11 A number of properties on the northern side of Thames Avenue had flood water in their rear gardens. The extent of the flood water varied, with the water level covering a greater area the further east the property is located on Thames Avenue. This flood water did not threaten internal areas of the properties; however a number of residents deployed sandbags or similar mechanisms across doorways and airbricks as a precaution.

The Sulham Brook and the River Pang

18.2.12 Flood water from the Sulham Brook and the River Pang affected areas of Tidmarsh and Pangbourne on two occasions: the 7th and 8th February; and the 14th and 15th February. The flood water did not completely recede between the two events, but the risk to properties and infrastructure abated.

18.2.13 The River Pang flows towards Pangbourne from the south, flowing through Tidmarsh immediately south of the village (refer to Drawing 70003227/18/102). North of the M4 the Sulham Brook and the River Pang flow in parallel approximately 250m apart.

18.2.14 The River Pang breached at two points to the south of Tidmarsh, just north of the M4. The first breach occurred as a result of a low point in the bank in this location. This allowed a gradual increase in the volume of water flowing out of bank as the water level in the river increased. The second breach occurred further north and allowed a significant volume of water to leave the river at a considerable velocity through a break in the bank. The velocity of the water caused considerable damage to the bank, increasing the hole in the bank and allowing an increasing volume of water to leave the river.

18.2.15 Water from the first breach point flowed east via the drainage ditch network to discharge into the Sulham Brook. Water in the ditches came out of bank in places resulting in external flooding of Moor Copse. Water from the second breach point flowed north into a drainage ditch which branches off the River Pang, which is controlled by a sluice. The drainage ditch flows east before turning 90^{o} to flow north towards Tidmarsh. Water flowed out of the section flowing north and flooded external areas of the Cottage, Nightingales, Willow Tree Cottage and Mill Corner Farm. This water continued to flow east, flooding Mill Lane to a considerable depth along almost its entire length. Mill Lane was closed as a result.

18.2.16 The waste water system of the Cottage was also flooded, meaning the residents were unable to use toilets and showers and consequently moved into a hotel for three weeks.

18.2.17 The maintenance of the drainage ditches in Tidmarsh, along which the flood water flowed from the River Pang to the Sulham Brook, varies significantly; some were recently cleared whilst others were considerably blocked with vegetation and silt.

18.2.18 Further north, on the southern perimeter of the village of Pangbourne, water flowed across Sulham Lane from Herridge's Copse to Broom Copse and into Sulham Brook (refer to Drawing 70003227/18/102). The depth of water on the road posed a risk to vehicles and the road was therefore closed for a short period from the 8th February.

18.2.19 Immediately south of Home Farm, Sulham Brook divides; one branch flows through Purley Hall Lake before being channelled beneath the Reading Road (A329) in culvert; the other feeds a millpond which discharges through two culverts before flowing alongside the eastern side of Sulham Lane to a second culvert beneath the Reading Road (A329).

18.2.20 The waters entry to and exit from Purley Hall Lake is controlled by two sluices. At the beginning of February both sluices were closed, meaning only minimal flow was able to pass through the lake; the vast majority of flow was through the millpond.

18.2.21 On the 7th and 8th February water overflowed from the millpond into the field to the north-west. This flood water then flowed across Sulham Road, before flowing north alongside the roadside hedgerow. A flood alleviation bund was constructed in parallel with the rear gardens of Briars Close following the 2000/01 flood event. There is a lower point in the flood alleviation bund close to Sulham Road. During the winter 2013-14 flood event the water flowed past the flood alleviation scheme, at the low point, and into the Pangbourne Primary School playing field. This water then collected along the boundary of the rear gardens of the Briars Close properties, encroaching into some of the gardens.

18.2.22 In the afternoon of the 8th February the low point of the flood alleviation scheme was sandbagged. This significantly reduced the volume of water collecting in the school playing field.

18.2.23 A second flood alleviation scheme, School Ditch Flood Wall, was constructed in 2013 to protect Pangbourne Primary School and Briars Close from overland flows from the south-west. The flood wall worked well during the winter 2013-14 flood event, preventing additional flows from threatening Briars Close from the south-west.

18.2.24 In an effort to further reduce the level of water threatening the properties in Briars Close, the spillway at East Chain Arch was lowered by approximately 150mm on the 9th February. A large volume of water discharged via the spillway into the Sulham Estate's field, north of Reading Road. This work significantly lowered the water level in both branches of the Sulham Brook. Following the flood event, it is anticipated the spillway will be re-built to the previous level and will be dug out if another flood event happens.

18.2.25 The sluices at the entry and exit to the Purley Hall Lake were opened on the 10th February to provide capacity for the next forecast rainfall event. The exit sluice was left fully open; the entry sluice was partially closed to reduce the level in the lake.

18.2.26 Since the winter 2013-14 flood event the Pangbourne flood wardens have taken over the operation of the Purley Hall Lake sluices to ensure they are opened and closed when necessary to minimise the flood risk to properties in Pangbourne.

18.2.27 On the 15th February water spilled out of the millpond again as a result of further rainfall on the night of the 14th February. The entry sluice of Purley Hall Lake was fully opened, reducing the water level in the millpond and stopping it overflowing.

18.2.28 Both the culverts beneath the Reading Road (A329) were able to cope with the flows during the flooding. There was maximum flow coming from Purley Hall Lake, as well as considerable flow from the millpond branch. Neither culvert caused further flooding or contributed to the flooding.

18.2.29 The majority of the water flowing from the Sulham Brook via the spillway into the Sulham Estate field re-entered the Sulham Brook in the north-west corner, by the roadway to the Thames Water treatment plant. The road and railway culvert was able to cope with the flows throughout the winter.

18.2.30 The Sulham Brook overflowed into the field north of the railway culvert throughout the winter of 2013-14. This field is classed as River Thames floodplain and the water in this field did not pose a threat to properties or infrastructure.

18.2.31 The section of Sulham Brook to the north of the Reading Road is well maintained. The Environment Agency has committed to maintaining this ditch annually. The landowners (West Berkshire Council, Sovereign Housing Association and a private resident) undertook maintenance in late December 2013 in addition to the Environment Agency maintenance undertaken earlier in the year. The Parish Council are happy to facilitate the maintenance of this stretch of the watercourse, if necessary.

18.3 West Berkshire Council Emergency Response

18.3.1 West Berkshire Council sandbagged the low point in the flood alleviation bund in the field between Pangbourne Primary School and Sulham Lane to reduce the volume of water flowing over the bund and threatening properties in Briars Close.

18.3.2 West Berkshire Council arranged for a digger to lower the spillway by the Reading Road (A329), lowering the water level in both branches of the Sulham Brook and helping reduce the risk of flooding to properties in Pangbourne.

18.3.3 A number of grips were cut in Mill Lane in an effort to reduce the depth of the flood water on the carriageway.

18.3.4 Mill Lane and Sulham Lane were both closed.

18.4 Risk Management Authorities

18.4.1 In addition to West Berkshire Council, the following Risk Management Authorities have relevant, flood risk management functions in Pangbourne:

- Environment Agency

Environment Agency

18.4.2 The Environment Agency issued a fluvial Flood Alert for the River Thames at Pangbourne on the 24th December. This alert was removed on the 9th March. A fluvial Flood Warning was issued for the River Thames at Pangbourne on the 7th January and removed on the 13th. A second warning was issued on the 8th February and was removed on the 19th February.

18.4.3 Environment Agency representatives were present in Pangbourne during the flood event.

18.4.4 West Berkshire Council has not been made aware of any further action taken by the Environment Agency.

18.5 Recommendations

18.5.1 In order to reduce the risk of flooding in Pangbourne the following measures should be considered:

Maintenance

18.5.2 Maintenance of Sulham Brook should be carried out on an as needed basis to ensure that the channel remains clear of all obstructions at all times, especially on the section between the A329 and the railway culvert, including the ditches on both sides of the A329.

18.5.3 Ditches and ordinary watercourses in the parish, and south of the parish in Tidmarsh, need to be regularly cleared of silt and debris to ensure surface water runoff is able to effectively drain off the land. This is also important to ensure that culverts do not become blocked or have their capacity reduced as a result of debris flowing in ditches and ordinary watercourses.

Minor Works

18.5.4 Options for formalising a spillway at East Chain Arch should be investigated. Digging out the spillway when the village is threatened by another flood in the future is not reliable, especially if the event is a flash flood. An alternative arrangement should therefore be implemented.

18.5.5 An investigation should be undertaken into the feasibility of implementing a series of drainage channels along Mill Lane to prevent flooding of the highway in the future.

Major Works

18.5.6 The breach points along the bank of the River Pang should be to retain water in channel for as long as possible before overtopping during times of high flow. The downstream impact of retaining the water in the channel during times of high flow should be investigated to ensure these works will not increase the risk of flooding to properties and infrastructure downstream.

18.5.7 The level of the flood alleviation bund in the field between Pangbourne Primary School and Sulham Lane should be raised, especially on the section closest to the road, to reduce the volume of water flowing over the bund and threatening properties in Briars Close.

18.5.8 Investigative works should be undertaken to determine potential areas upstream of Tidmarsh where water from the River Pang can be stored during times of high flow. The area immediately west of the cross-over of the M4 and A340 could serve as a potential flood attenuation area.

Other Works

18.5.9 A review of the operation responsibilities and requirements of Tidmarsh and Pangbourne Mills should be undertaken to ensure flow through these structures is optimised. This review should address the need for de-silting the millstreams; include a robust system for operating the sluices, together with an assessment of the current condition of the sluices and their fitness for use; set out clear lines of communication with those responsible for operating the sluices; set out arrangements for access for Environment Agency personnel to both sluices in the event of the absence of the owner; and detail an annual maintenance schedule to ensure efficient operation.

18.5.10 It is recommended that the Boathouse Surgery liaises with the Parish Council to ensure their contingency plan for flood events is suitable and up-to-date. This plan is essential to ensuring vulnerable patients are able to access healthcare services when the Surgery is in accessible during a flood event.

18.5.11 There is a need to educate residents affected by flooding from the River Thames about the benefits and capabilities of sandbags; the Parish Council understand that there are a number of residents mis-educated on the scope of benefit that can be provided by sandbags. Information portrayed in the media needs to reflect this message.

19 Purley on Thames

19.1 Introduction

19.1.1 The Parish of Purley is located in the north-east of West Berkshire. The River Thames flows north to south along the eastern boundary of the Parish and the A329 runs west to east through the southern area of the Parish. The 'Back Ditch' flows west to east in parallel with the Thames in the fields to the north-west of the village. The Back Ditch branches off from the Thames a short distance upstream of the village before flowing back into the Thames just south of Mapledurham Lock.

19.1.2 The main populated area of the Parish is the village of Purley on Thames, which is located to the south-east, alongside the River Thames. To the north and west the village is surrounded by open agricultural land and woodland. To the south the village merges with residential development in Tilehurst.

19.1.3 In the winter of 2013-14 the village of Purley on Thames experienced flooding as a result of water overtopping the banks of the River Thames. Water from the river affects two distinct areas of the village, with the flood water in each area joining up in the north of the village. The village was also affected by sewage water surcharging from the foul network causing flooding in St Mary's Avenue.

19.1.4 Twenty-nine properties within Purley on Thames suffered flooding to internal areas, with an additional seven properties suffering flooding to garages or utility areas. Twenty further properties experienced external flooding. Significant flooding of the highways meant that Mapledurham Drive, Wintringham Way, Chestnut Grove, River Gardens, St Mary's Avenue and parts of Colyton Way and Brading Way became impassable and had to be closed. Drawing N^{o}.s 70003227/19/101 to 19/103 identify the flooded properties, the approximate flood extents and the directions flood water took through the village.

19.2 Flooding in Purley on Thames

River Thames

19.2.1 The water level in the River Thames peaked twice at Purley on Thames during the winter 2013-14 flood event, flooding the village between the 8th and 10th of January and again in early February. The water level did not completely recede in between each event, but it dropped sufficiently to ensure the water receded from internal areas of properties. The water level dropped significantly at the end of January and it appeared that the water was set to recede completely; however the levels in the Thames rose again at the beginning of February.

19.2.2 Two distinct areas of Purely on Thames are affected by flood water from the River Thames. The first area is made up of properties to the west of the village, in Mapledurham Drive and Colyton Way. The second area comprises properties to the east of the village, along River Gardens and Wintringham Way. The flood water from the two areas joined up along Wintringham Way.

<u>Mapledurham Drive and Colyton Way</u>

19.2.3 Prior to the first flood peak, in January, water from the Back Ditch flooded the fields to the north-west of Purley on Thames. Water also collected in these fields as a result of rising groundwater, through the permeable sediments of the floodplain. These sediments provide a subsurface route for flood waters to bypass higher ground along the banks of the river, which would otherwise protect these areas. In addition, the River Thames breached its bank in a number of locations to the north-west of Purley on Thames, adding to the flood water in the fields.

19.2.4 The flood water in the fields flows west to east, back towards the River Thames.

19.2.5 'The Causeway', the access track to Mapledurham Lock (from Purley on Thames), runs north to south through the field to the north-west of the village, and acted as a dam, preventing the water from flowing west to east. The water was instead diverted south alongside the Causeway, resulting in a large volume of water collecting in the recreation ground and the field immediately west of Mapledurham Drive.

19.2.6 As the level in the Thames rose, the volume of water collecting in this field increased. The water flowed from the field onto Mapledurham Drive opposite N^{o}. 5. The flood water then flowed in both directions along the road, affecting all of the properties in Mapledurham Drive to varying degrees.

19.2.7 A number of the properties in Mapledurham Drive are designed so that the ground floor of the property comprises a garage and/or utility room, with the living accommodation on the first and second floors. Therefore, when the area is in flood, the living accommodation is not at risk. A number of other properties are situated at a higher elevation in an effort to reduce the risk of flooding to internal areas of the property.

19.2.8 N^{o}. 1 and 2 Mapledurham Drive flooded externally. Water did not affect any internal areas of the properties as both houses are raised up.

19.2.9 N^{o}. 3 is an older 'shack' property, built following the Second World War. The property is situated at a lower elevation and consequently, experienced flooding to internal areas of the property. This flooding was a combination of fluvial water flowing from the field and groundwater rising in the garden of the property. Groundwater is frequently observed rising in the front garden of the property following heavy rainfall in the winter months.

19.2.10 N^{o}. 4, 6 and 7 Mapledurham Drive experienced flooding to internal areas of the properties, with flood water in the front gardens approximately 1,200mm deep.

19.2.11 N^{o}. 5, 8 and 9 experienced external flooding and flooding to the integrated garages.

19.2.12 N^{o}. 10, 14 and 16 all experienced flooding to internal areas of the property to a depth of approximately 750mm.

19.2.13 As the water level continued to rise in the field immediately west of Mapledurham Drive, the water started to spill out of the field onto the road in a number of places, in addition to the point opposite N^{o}. 5, increasing the volume of water in this area.

19.2.14 N^{o}. 11, 12, 13, 15, 17 and 18 all experienced external flooding as a result of flood water flowing across Mapledurham Drive, directly from the field.

19.2.15 N^{o}. 19 experienced flooding to internal areas of the property as a result of rising groundwater beneath the property coming up through the floorboards. The front garden of the property was unaffected by flood water. The property is situated at a lower level than other nearby properties in Mapledurham Drive.

19.2.16 Flood water flowed between N^{o}. 4 & 5 and N^{o}. 5 & 6 Mapledurham Drive before flowing south to north through the rear gardens of N^{o}. 3 – 18 Mapledurham Drive. This water then flowed east towards Colyton Way. The majority of properties along the western side of Colyton Way therefore had flood water in their rear gardens, but this water did not threaten to flood internal areas of the properties. This flood water flowed onto Colyton Way itself via the alleyway between N^{o}. 7 and N^{o}. 9 and through the gap between N^{o}. 33 and N^{o}. 39. The flood water took approximately 8 hours to flow from Mapledurham Drive to Colyton Way.

19.2.17 N^{o}. 7, 9 and 11 all used a combination of sandbags and pumps to prevent the water entering internal areas of the properties. It is understood that if these actions had not been undertaken all three properties would have had flood water ingress to the ground floor.

19.2.18 On the western side of Colyton Way, N^{o}. 1 and 33 experienced flooding to internal areas as a result of the flood water flowing west to east from Mapledurham Drive. N^{o}. 39 experienced external flooding within the grounds of the property; the flood water did not threaten to enter internal areas of this property.

19.2.19 The majority of the properties along the eastern side of Colyton Way did not experience flooding and were not at risk of internal flooding. The only property on this side of the road to flood internally was N^{o}. 20. N^{o}. 10 experienced minimal external flooding in the front garden.

19.2.20 Colyton Way itself was completely inundated by flood water, with access to properties along the majority of the road only possible by boat. This flood water extent extended a small distance into Brading Way, but the majority of Brading Way was unaffected.

River Gardens and Wintringham Way

19.2.21 To the east of Mapledurham Lock the River Thames came out of bank in a number of places due to high levels in the river. This water collected in the field to the north of Wintringham Way and flowed into the rear gardens of the majority of properties on the north side of Wintringham Way.

19.2.22 N^{o}. 40, 50, 56 and 80 Wintringham Way all experienced flooding to internal areas. N^{o}. 40, 50 and 56 are set back further from the road than the majority of the properties in Winteringham Way and were therefore closer to the flood water. All three properties are also located at a slightly lower level than most properties in Wintringham Way, again contributing to these properties flooding.

19.2.23 N^{o}. 52 and 58 experienced external flooding due to the flood water flowing into the grounds of the properties from the field to the north.

19.2.24 The Social Club, located between N^{o}. 80 and 86, also experienced flooding to internal areas as a result of the flood water in the field to the north.

19.2.25 On the south side of Wintringham Way the gardens of the properties between Wintringham Way and Brading Way were flooded to varying degrees as a result of groundwater rising via the permeable sediments of the floodplain. N^{o}. 21, 29 and 31 experienced flooding to internal areas as a result of rising groundwater in the rear gardens which flowed into the houses.

19.2.26 Properties along the northern side of Brading Way experienced flooding in their rear gardens to varying degrees as a result of rising groundwater .

19.2.27 South of Wintringham Way the carriageway of Chestnut Grove was completely flooded, but none of the properties on this road were affected by flood water.

19.2.28 A storm drain pumping station is situated at the junction of Chestnut Grove and Brading Way. This station comprises two pumps, which work to pump surface water flows into the River Thames via a storm water drain situated beneath Calley's Alley. It is understood that the two pumps alternate and are not set up to pump in unison.

19.2.29 The Environment Agency pumped the fluvial flood water from the junction of Wintringham Way and Chestnut Grove. This pumping is not thought to have had any benefit in lowering the flood level in the vicinity of Wintringham Way and Chestnut Grove as the water level in the River Thames was so high it was unable to take the water being pumped into it.

19.2.30 Further east a number of properties experienced flooding along River Gardens. The water rose up through the ground in the front gardens of a number of the properties as a result of the permeable sediments of the floodplain. The access road of River Gardens is situated at a higher level than the majority of the plots and as a result, remained dry for a significant duration of the event.

19.2.31 The first property to be affected by flood water was N^{o}. 6, which experienced flooding to internal areas of the property. The properties along River Gardens to the north of Wintringham Way did not experience any flooding during the winter 2013-14 event.

19.2.32 The garages of N^{o}.s 7, 8, 9 and 10 flooded. These properties are arranged with the living accommodation on the first floor, meaning the living accommodation was not flooded.

19.2.33 N^{o}.s 11, 12, 14, 15, 16 and 18 all experienced external flooding.

19.2.34 N^{o}.s 17, 19, 20, 21, 24, 25 and 26 all experienced flooding to internal areas of the property.

19.2.35 The land in between N^{o}. 21 and 24 comprises a grassed plot, on which a static caravan is permanently sited. The caravan is only slightly raised off the ground and was therefore flooded internally during the winter 2013-14 flood event.

19.2.36 The Boathouse is in the process of being constructed. The built sections of the house did not flood internally as it is being constructed on stilts.

Sewage flooding

19.2.37 During the winter 2013-14 flood event St Mary's Avenue experienced significant flooding from the foul sewage network.

19.2.38 It is understood that all foul water from properties north of the A329 Oxford Road is routed to the Thames Water foul water pumping station on Brading Way. All foul discharge in this area, south of St Mary's Avenue, flows to the foul water pumping station via the pipe beneath St Mary's Avenue.

19.2.39 When Purley on Thames is flooded, the foul system becomes inundated with flood water. During the winter 2013-14 flood event this resulted in foul water surcharging from the manholes along St Mary's Avenue, and those located in the front gardens of properties on this road.

19.2.40 St Mary's Avenue itself was completely flooded with sewage water in early January, with the road being officially closed on the 9th January due to the depth of the flood water making it impassable. This water flowed into the driveways of some properties but no properties were flooding internally as a result of the foul water on the highway.

19.2.41 The Parish Council requested assistance from Thames Water in the clean-up of the area on the 10th January. The flood water remained until the 12th January. On the 17th January, residents of St Mary's Avenue requested 'Health Hazard' signs to be situated either side of the area affected by sewage to warn people of the risks.

19.2.42 The foul sewer serving Mapledurham Drive runs parallel with the field boundary, immediately west of the road. The manholes in the field are not sealed, allowing flood water to enter the foul network when water collects in the field. During the winter 2013-14 flood event the flood water entering the foul system resulted in the system being inundated, meaning the majority of residents in Mapledurham Drive were unable to use their toilets and showers.

19.3 West Berkshire Council Emergency Response

19.3.1 West Berkshire Council closed Colyton Way, Brading Way and St Mary's Avenue on the 9th January. Mapledurham Drive, Wintringham Way, River Gardens and Chestnut Grove were also closed during the flood event.

19.3.2 Portaloos were supplied.

19.3.3 West Berkshire Council supplied sandbags and the Army were in the village to help deploy them.

19.4 Risk Management Authorities

19.4.1 In addition to West Berkshire Council, the following Risk Management Authorities have relevant, flood risk management functions in Purley on Thames:

- Environment Agency
- Thames Water

Environment Agency

19.4.2 The Environment Agency issued a fluvial Flood Alert for the River Thames at Purley on Thames on the 24th December which was removed on the 9th March. A fluvial Flood Warning was issued for the River Thames at Purley on the 27th December and removed on the 30th December. A second warning was issued on the 5th January and removed on the 21st. A final warning was issued on the 1st February and was removed on the 22nd February.

19.4.3 The Environment Agency flood warning phone call was received at 2am. The timing of the call caused a number of residents, whose children were on a night out in Reading, to panic. The Parish Council request that the system is altered so as that these calls are not made during unsociable hours in the future.

19.4.4 The Environment Agency installed 4 pumps at the junction of Chestnut Grove and Wintringham Way in an effort to pump the fluvial flood water back to the River Thames. It is understood this pumping did not affect the flood levels in the area as the levels in the River Thames were too high to convey the water away.

19.4.5 Environment Agency representatives were present in Purley on Thames during the flood event.

19.4.6 West Berkshire Council has not been made aware of any further action taken by the Environment Agency.

Thames Water

19.4.7 The Parish Council requested assistance from Thames Water in the clean-up of St Mary's Avenue. Thames Water cleaned the area affected by sewage once the flood water had receded.

19.4.8 West Berkshire Council has not been made aware of any further action taken by Thames Water.

19.5 Recommendations

19.5.1 In order to reduce the risk of flooding in Purley on Thames the following measures should be considered:

Maintenance

19.5.2 Regular maintenance of the River Thames is required to ensure the capacity of the channel is not reduced as a result of the build-up of silt along the base of the river. It is understood the River is currently badly silted to the South of Mapledurham Lock.

19.5.3 The highway drainage network should be checked following the flood event to ensure the inundation of the system from surface runoff and flood water has not resulted in large volumes of sediment and / or waste to cause blockages to the network.

Minor Works

19.5.4 The manhole covers in the field immediately west of Mapledurham Drive could be sealed to prevent the ingress of flood water into the foul sewer system in this area and hopefully sustain capacity for longer during future flood events.

19.5.5 An investigation should be undertaken to establish the feasibility of setting the pumps in the storm drain pumping station to work in unison during periods of high rainfall to ensure the maximum volume of surface water is channelled away from the village via this system.

Major Works

19.5.6 An investigation is required to establish suitable works to enable water to flow beneath/over the Causeway during flood events and prevent water from flowing south and collecting in the field to the west of Mapledurham Drive. One option is to install a series of box culverts beneath the Causeway, enabling the flood water to flow in to the fields to the east, and back into the River Thames. Alternative works include lowering the level of the Causeway in a number of places. However, the Lock must be accessible during flood events to ensure the Lock can be operated. Any works undertaken therefore, must ensure access can be maintained when the field is flooded.

19.5.7 The bridge in the Causeway crossing the Back Ditch is in poor condition, with the level of the bridge having lowered considerably as a result of the weight of traffic passing over the bridge and undercutting from erosion. This has resulted in the capacity of the channel being reduced by the bridge. This bridge needs to be rebuilt, with the level raised to ensure the flow of water in the Back Ditch is not constrained during times of high flow. The new bridge needs to be designed to be able to accommodate the weight of the lorries which travel across the bridge to Mapledurham Lock.

19.5.8 To further prevent the flow of flood water into the field immediately west of Mapledurham Drive, the benefits of building a bund between the recreation ground and the field to the south should be investigated. A bund in this location would serve to reduce the volume of water causing flooding to the properties along Mapledurham Drive. The impact of this bund on the properties immediately east in Wintringham Way should be assessed to ensure the flood risk to these properties is not increased as a result.

19.5.9 A bund should be constructed to the rear of the properties in Wintringham Way, in the field in which flood water from the Thames collects. This bund has been forward and backward to planning for a number of years. The construction has been delayed as planning permission has been repeatedly refused for a variety of reasons, including the location of tress in the vicinity of the proposed bund. The current plans for the bund propose a height of 39m above Ordnance Datum. These plans have been re-submitted to the planning authority and a decision is anticipated at the end of July 2014. If approved, it is paramount that this bund is fully turfed prior to winter 2014-15 to ensure it is stable, and any flooding does not wash away the soil forming the bund. A local farmer has offered to provide the soil for the bund.

19.5.10 An investigation needs to be undertaken by Thames Water to establish the condition of the foul sewer network in Purley on Thames, including misconnections or damaged areas. This investigation should identify the areas where repairs are required in order to reduce the amount of surface water, groundwater and fluvial water overloading the foul network. An alternative option for Thames Water to consider would be the possibility of increasing the capacity of the pumping station to remove the water from the foul system faster.