WEST OXFORDSHIRE
DISTRICT COUNCIL

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Parish Flood Report:
Alvescot

July 2008

Version 1 – This report may be revised in the future to incorporate ongoing consultation results

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1.0 INTRODUCTION

On the 20th July 2007 large parts of the South of England were subjected to intensive storms. The scale and speed of the rainfall was unprecedented and took most communities by surprise causing widespread flooding of highways and property. On this occasion, unlike previous storms / flooding experienced, this impacted on many properties that had never been affected before, due to much of the flooding coming in the form of rain water run off from land.

A swathe of the district was particularly badly affected by the massive storms, which commenced in the morning and subsided in the evening. During the following days further disruption occurred due to rising river levels. At RAF Brize Norton, the records show that over 125 mm (5 inches) of rain fell in 12 hours, and this is a record going back over 100 years. Not only that, but the period from May to July had been the wettest on record since 1903 and meant that the ground was saturated and unable to absorb any more water.

On the 10th October 2007, the District Council's Cabinet considered a report of the Head of Street Scene and approved additional resources in order that a review of the affected areas could be carried out and further reports be prepared for the Council's considerations.

1.1 Purpose of the report

In response to requests from both the Parish and Town Councils and the general public West Oxfordshire District Council has produced a number of reports that identify each individual cause of flooding within the Parish / Town, what work is being carried out by external agencies (EA, Thames water etc); what the potential options are for future mitigation - and who might be best placed to fund such schemes. The reports themselves reflect the series of water systems that all played a part in the flooding experienced in July 2007 and will help all the organisations involved understand the need to sequence their activities.

This report has been prepared by a qualified Engineer in consultation with the key external agencies and seeks to explore the main reason behind why the floods happened in July 2007 and give an overview of the event itself. It will also provide an understanding of the different roles and levels of responsibility for the agencies involved.

This report should be used to make sure that all the agencies involved with flood prevention – like the Environment Agency, Thames Water, Oxfordshire County Council, Town / Parish Councils and private land owners – work in true partnership for the good of everyone in the local community.

A key outcome of the reports is that residents are given a broad overview of the complex linkages between the different organisations involved and also the range of options available.

1.2 Roles and responsibilities

One of West Oxfordshire District Councils key ongoing roles is to continue to lobby National agencies / Government on behalf of the residents and businesses of the district to secure funding and/or additional resources to assist with flood prevention and other relevant activities. The Council will also work closely with other agencies and organisation in order to highlight the local issues and actions identified in the report.

The legal responsibility for dealing with flooding lies with different agencies and is complex, so below is a simplified summary.

Environment Agency (EA) – permissive powers[1] for main rivers

Oxfordshire County Council (OCC) –Responsible for adopted highways and highway drainage.

Thames Water (TW) – Responsible for adopted foul and surface water sewers.

West Oxfordshire District Council (WODC) – duties as a riparian[2] land owner, and permissive powers[1] under Land Drainage Act 1991, Public Health Act 1936, Highways Act 1980 and Environmental Protection Act 1990.

Private land owners - duties as a riparian land owner.

1.3 Consultation and consent

The key organisations mentioned above are currently carrying out their own investigations, but operate independently of each other, have different methods of prioritisation and different funding criteria. The District Council has consulted with these agencies together with Parish Councils, Town Councils and individual property owners in order to prepare this report.

It is recognised that the majority of the options proposed in this report require further investigations / feasibility studies and / or consultation before they are carried out. Therefore these options may not be appropriate in every case when full costings, environmental, landscaping, biodiversity, built environment and historic factors are fully considered.

When considering protection against future flooding, it must be emphasised that the risk and impact of flooding can be mitigated against but in some cases not fully removed.

1.4 Response to this report

The options section of this report highlights the potential areas of work / activities under the responsible agency, for example the Environment Agency, West Oxfordshire District Council etc. If you have any specific questions relating to these activities please contact the relevant agency using the contact details provided at the top of the chart.

If you have any general questions please contact your Parish / Town Council who have been a key contributor to the production of the report and have agreed to act as the first point of contact.

The Council is also planning to hold a series of road shows in the Parish areas where representatives from all the relevant areas will be available to answer any questions local residents have as well as provide more information on ways residents may help themselves.

[1] Permissive powers are when an organisation may choose whether or not to exercise their powers. I.e. they are NOT under a duty. In making this choice account must be taken of any factors required by the legislation, plus for example how urgent, how necessary they are, cost, likely result, etc

[2] Riparian owners are responsible for the maintenance of any watercourse within or adjacent to the boundaries of their property.

1.5 Legal

2.0 THE DISTRICT COUNCIL'S ACHIEVEMENTS OVER THE PAST 12 MONTHS

Ditch Clearance

- 1731 Linear metres WODC owned ditches cleared overall
- 1923 Linear metres Privately owned ditches cleared overall
- Overall 2.27 miles of ditches have been cleared

Flood Grants

- 1137 WODC Flood Grants totalling £284,250 given out overall
    - 28 (£xx) for Alvescot
- 112 Red Cross Flood Grants totalling £211,590 administered by WODC overall
- 301 Hardship Grants totalling £155,050 given out overall

Reports

- Interim Flooding Report published October 2007
- 12 Parish Flood Reports completed by June 2008

Actions from the Council's Interim Report published in January 2008

- The table below provides a summary of some of the completed actions identified in the report

Bronze command procedure to be updated to recognise the need for ensuring shift rotas are in place in the early stages of an emergency
Consider producing a revised warning system that identifies a higher category of risk that is only issued in exceptional circumstances
The emergency plan specifically addresses the need to keep in regular contact with elected members
That in future emergency situations District Councils ensure that they have a representative present at Silver Command from the start of the emergency to act as a conduit for information between Silver Command and the District Councils
The council should encourage all residents residing in the flood plain and in areas at risk of flooding to sign up to the EA Flood Alert system.
Provide clear information to residents and businesses about what type of waste we can collect and how it will be collected
Explanations to residents of our need for bulky waste to be placed on the roadside for collection
Commence a review of the mapping of the many thousands of privately owned ditches and culverts, and ensure they are kept clear and well maintained in accordance with the new policy (2 TOR 3)
Lobby central government for a single agency to take control of all land drainage issues
WODC continues to act in a coordination capacity with key external agencies
Continue to liaise with EA to ensure that procedures relating to planning consultations are robust. Seminar being arranged to take place during 2008 to progress this
Progress the Strategic Flood Risk Assessment
Approaches to be made to the EA and Metrological Office with regard to improving their predictive capability
During emergency events, have an external media person (BBC) in Bronze Command
Purchase digital TVs to assist with reviewing weather, local and national news to assist emergency management

3.0 EXECUTIVE SUMMARY

Following the flooding events of July 2007, West Oxfordshire District Council (WODC) has responded to requests from both Town and Parish Councils to aid the coordination of all the agencies and bodies that were undertaking their own investigations into the floods through the production of Parish Flood Reports.

This document is the Parish Flood Report for Alvescot and has been prepared by the Council's Engineering team. It pulls together information from external agencies and individual property owners and seeks to identify the causes of flooding in Alvescot during July 2007 and potential mitigating solutions.

Alvescot is a rural parish located at the south western corner of RAF Brize Norton, approximately 6 miles to the south east of Burford and 10 miles to the south west of Witney in the heart of the Cotswolds. The parish sits in the catchment of the River Thames and contains two watercourses, the Shill Brook flowing in a south easterly direction in the north east of the Parish and the Clanfield Brook which rises in springs to the west of the village flowing towards Clanfield.

Visual walkover surveys have been undertaken of the flooded areas and properties and meetings have been held with affected residents. WODC have record of 28 applications for Grant Aid in Alvescot, being 3 in Mill Lane area, 15 on Station Road, 9 in Lower End and a single property in the south of the parish.

Flooding experienced in Alvescot has been assessed in three separate areas (see section 4.1) comprising from north to south, Mill Lane (Area 1), Station Road (Area 2) and Lower End (Area 3).

Properties on Mill Lane (Area 1) suffered extensive damage with 3 properties claiming flood grant aid. Flooding was noted as originating from two main sources being the Shill Brook which burst its banks and excessive localised overland flow from surrounding farm land.

Flooding in Station Road (Area 2) has been attributed to a combination of factors including inadequate highway drainage, overland flow from surrounding farmland and groundwater ingress.

Lower End (Area 3), floods on a regular basis which has been attributed to surface water flooding due to inadequate road drainage and failure of the Thames Water Pumping Station.

Flooding problems and options, including description of works and how each public and private body is affected, effectiveness of each solution, affects on adjacent land and cost, are included in Section 5.

Conclusions and recommendations, including maintenance and flood defence improvement measures and a programme, are provided in Section 7.

This report also includes Appendix 1 showing Photographs, Appendix 2 showing Maps and Appendix 3 provides a glossary.

4.0 SURVEY

4.1 Description of Area

The Village of Alvescot is located adjacent to the south west of RAF Brize Norton, approximately 6 miles to the south east of Burford and 10 miles to the south west of Witney in the heart of the Cotswolds.

The Parish is rural in nature forming part of the catchment of the River Thames. The Village sits in between two watercourses, the Shill Brook and the Clanfield Brook.

The Shill Brook rises to the north of the Parish of Shilton, flows along the western border of Carterton, underneath the runway of RAF Brize Norton to enter the parish of Alvescot.

At this point the Shill Brook is joined by a tributary from the west. Flows converge for a short time before being split to a main channel and mill race associated with Mill House at the end of Mill Lane. The channels re-converge at the border of the Alvescot Parish and flow in a south easterly direction, past the Thames Water Sewage Works and onto the village of Black Bourton.

The Clanfield Brook rises in a series of springs and ditches to the west of the village. The stream flows in a south easterly direction to the south west of the village; crossing the abandoned railway the stream flows towards the village of Clanfield, to the Radcot Cut and ultimately the River Thames.

Using the Flood Estimation Handbook (FEH), the catchment area of the Shill Brook to Mill House is calculated to be 37.20km2, to include both the Shill Brook flowing from the north and the smaller tributary flowing from the west. Using the same method, FEH calculates the area of the Clanfield Brook to be 2.18km2.

4.2 Survey Method

A visual walk-over survey of properties affected by the July 2007 flooding has been undertaken including Mill Lane, Station Road and Lower End. A visual inspection of the Shill Brook has also been made.

See Appendix 1 – Photographs.

4.3 Meetings

A summary of meetings about Alvescot flooding in July 2007 are given in Table 1.

Table 1: Summary of Meetings and Flooding Descriptions

Date	Location	Description
10.07.01	Letter to WODC re flooding of July 2001	• Residents feel that the cause of flooding at Lower End was primarily caused by TW as no standby generator was available to maintain operation of pumps during a power failure. • The above was compounded by inadequate storm water drainage to cope with the volume of water on the road. • Residents noted that there has been no upgrade of the foul or storm water system since 30-40 new dwellings have been erected upstream.
19.07.01	Letter to OCC outlining meeting of 19.07.01	• 2.5" rain fell within 2 hrs and road drainage could not cope. This may be due to inadequate maintenance. • TW stated that this led to infiltration of rainwater to the sewer network. • Four new properties in Lower End discharge storm water directly to the road – increasing flood risk at Lower End.
30.07.01	Letter from OCC re meeting 19.07.01	• OCC comments as follows: • OCC have asked the area liaison officer to look into discharges from development upstream of Lower End. • Cleaning of highway drainage to outfall at Clanfield brook is planned. • OCC recommended fitting of non-return valves to affected properties.
24.07.01	Letter from WODC dated 24/07/01 re meeting 19.07.01	• WODC to discuss drainage details of new development upstream with Planning department • WODC to attend when OCC carry out drainage works to enable a clear understanding of the drainage in the area. • WODC to contact TW regarding the use of mobile generators. • WODC will issue sandbags if property is in danger of flooding from external sources.

Table 1: Summary of meetings and flooding descriptions (cont…)

Date	Location	Description
01.08.01	Letter to WODC re meeting 19.07.01	• TW have confirmed that standby generators could be used but it is a matter of pre-designated priority. • TW stated that following flooding of July 2001 Alvescot the alarm priority of the pumping station has been increased • Sandbags can't stop all the flooding as old properties are prone to water rising through floors.
01.05.03	Letter to WODC Lower End	• A meeting was held at Stone Cottage on 19th July 2002 to discuss flooding experienced in Lower End.
01.05.03	Letter to OCC Lower End	• Gully cleaning completed by OCC in Alvescot 31.04.03 and 01.05.03. • Concerns raised by local residents that gully cleaning does not continue past the end of the road in Lower End (i.e. to the outfall to Clanfield Brook). • Following flooding of July 2001, OCC agreed to- 1) check the discharge of storm water from any newly built properties upstream of Lower End 2) OCC to supervise the cleaning on Highway Drainage System at Lower End and onto the outfall (to Clanfield Brook) • Flooding in January 2003 of highway at Lower End, considered by local residents to be due to poor maintenance of highway drainage (residents believe that the highway drainage system has not been cleaned since 2001)
11.03.04	Letter to TW Lower End	• Letter to report flooding of foul water from manhole in road at Lower End (March 2004). • TW provided a pump within 1 hour of the flooding being reported, however the same problem arose the next day. • Residents noted that the flooding was a repeat of that experienced in July 2001 and January 2003, however, there has been no rainfall contributing to the problems on this occasion. This suggests that the system is not sufficiently sized to contain the volume of waste water it is trying to discharge.

Table 1: Summary of meetings and flooding descriptions (cont…)

Date	Location	Description
26.03.04	TW reply to above letter 11.03.04	• TW have been out to site and have cleared a blockage from the system. TW have attributed flooding to be from this cause and have no plans at this stage to investigate further. • Contractors noticed that two manholes had become buried and works is required to determine if these need to be raised.
30.04.04	Letter to TW re above letter 26.03.04	• Local residents state that blockage within the curtilage of any property is the property owners responsibility but when waste water enters the sewer, it is TW's responsibility to ensure its free passage. • Local residents therefore request regular maintenance by TW to ensure the above.
05.05.04	TW reply to above letter 30.04.04	• TW state that the sewer 'line' will be cleaned in the next two months.
29.12.04	Letter to TW re further flooding of lane at Lower End	• 28th December 2004 – blocked sewer caused flooding of lane at Lower End. • TW engineer stated that the blockage was located at the point where the sewer turns left just before discharging into the storage tanks – at the same location of blockage two weeks prior where engineers state there is a 'rough connection'

06.07.06	Letter to TW	• Sewage leaking from pumping station 06.07.06
		• EA & TW attended – the leak was due to a faulty return valve.
		• 06.07.08 power cut in Alvescot and heavy rainfall led to flooding of Lower End.
		  • Is storm water entering foul system as flooding occurred so quickly
		  • Was the pumping station storage full i.e. not emptied over night?
		• Local residents call for a standby generator to prevent this from happening in the future
		• In 2001, TW increased the priority of Alvescot

21.07.06	TW reply to letter of 06.07.06	• TW confirm that the pumping station is designed to cope with abnormal flows. • TW agree that a standby generator is a good idea but needs to be prioritised depending on severity and frequency of events. • TW confirm that misconnections may lead to surface water entering foul water system. TW have no authority to investigate private network.

Table 1: Summary of meetings and flooding descriptions (cont…)

Date	Location	Description
15.08.07	Letter to TW re flooding	• Letter to request TW to upgrade system installed over 18 years ago to meet the needs of Alvescot and increased residents.
03.09.07	Letter from TW	• Outlining the extreme nature of July 07 event
18.11.07	Letter to EA regarding flooding at Mill Lane	• Local resident suggests that flood flow be directed down the main Shill Brook Channel and not down the Mill Race so as to move water away from property and prevent flooding.
06.02.08	Letter to TW	• Flooding from foul manhole in Lower End. • OCC were contacted and had a road sweeper there within an hour. • TW established that the blockage in the system was at the right angled bend on approach to storage tanks.
07.02.08	Letter to TW	• Local residents call for TW to solve problems of foul water 'bubbling up from drainage' in street
10.04.08	TW	• TW are to carry out a CCTV survey in the next month as the line has been cleaned.
06/06/08		• 03/06/08 road at lower end flooded to depth of 150mm following a period of prolonged heavy rain. Local residents observed that the outfall for the highway drainage which runs across fields was running very slowly and seemed likely to either partially blocked or undersized. • In the same event inspection covers on the TW sewer were bubbling foul sewage onto the road which then drained to highway drainage and onto the Clanfield Brook.
10.06.08		• No one in Lower End is aware of TW having completed the CCTV survey and there is no sign of the covers having been lifted. • Highway drainage – local residents have looked at the highway drainage inspection chamber where the road drainage turns to its outfall direction across the fields to the Clanfield Brook. There are two large highway drains discharging at this point, one estimated to be 300mm, the second 450mm. Local residents believe that the outfall for these drains is only 150mm diameter and partially blocked. • The larger of the two drains (450mm) was installed approximately 15 yrs ago to relieve ponding on the road • Residents understand that on 20th July 2007, TW shut the pumping station down at Lower End – is this normal operating procedure? • Residents believe that Kencot is being connected to the same pumping station which will make the current situation worse.

Table 1: Summary of meetings and flooding descriptions (cont…)

Date	Location	Description
17.06.08	Fraser Spence, Station Road Resident	• Mr Spence's property as well as others on Station Road were flooded by the sheer volume of rainwater. This was unable to soak into the ground as in July 2007, the soil was already saturated. Mr Spence experienced flooding to a depth of 8 inches within his property which remained for approximately 12 hours before soaking away. • As discussed in Table 2 below, OCC have replaced a section of highway drainage at the western end of the village that had collapsed partially due to tree roots. Residents are concerned that this problem extends further than just the western end of the village. • A further property on Station Road has flooded four or five times since July 2007 due to groundwater ingress.

WODC has liaised with the Environment Agency, Oxfordshire County Council and Thames Water as part of this report. All of the above have met with various residents of Alvescot recently.

Details of conversations in May/June 2008 are included in Table 2.

4.3 Stakeholder Communications and Actions

Table 2: Summary of Telephone Calls made with EA, TW and OCC (June 2008)

Company	Comments
EA	EA visited Mill Lane area 13.12.07 following letter from resident 18.11.07 Phone call to David McKnight regarding flooding in Alvescot. David confirmed that he had walked the Shill Brook at Alvescot and talked through the idea of re-directing the majority of flows down the Shill Brook rather than the Mill Race. David thought that while this may work during lower return period events, flooding only occurs in extreme events. During extreme events, the two channels become one and flooding would still occur in Mill Lane. He did not feel that the EA would be able to justify the work on a cost/benefit or technical basis. The Shill Brook is maintained by riparian owners at this location. EA also confirmed that RAF Brize Norton will be re-designing the existing trash screen on the Shill Brook upstream of Mill Lane and will increase maintenance on the new structure, to include clearance of the grill on a monthly basis and clearance on an exceptional basis in times of flooding. It was not felt that leaving the trash screen partially blocked would be advantageous as the debris would at a point 'burst' through the trash screen and cause a sudden surge down the Shill Brook which could potentially cause more damage than regular maintenance The EA do not currently offer a full flood warning service to the Shill Brook as they do not have any flood warning level gauges on the shill Brook.

Table 2: Summary of Telephone Calls made with EA, TW and OCC (cont…)

Company	Comments
OCC	Phone call to Gordon Hunt at OCC. Gordon confirmed that OCC have carried out works earlier this year on Station Road at the Kencot end of the Village (western end). Surface water was flowing from a spring and was causing ponding of water on the highway. OCC have replaced a collapsed drain and pipeline to alleviate the problem. OCC have carried out work on the road to Carterton to the west of the village where a puddle often formed during periods of heavy rainfall. OCC are intending to carry out maintenance of highway drainage in their parish as per their standard maintenance regime.
TW	TW on March 2004 visited Lower End and cleared blockages from the sewer system. It was noted that no more works was planned at this stage. Contractors noticed that two manhole covers had become buried and work is required to determine if these need to be raised to be level with the surface. TW state in 2006 that a standby generator is a good idea but expenditure has to be prioritised Pumping station at Alvescot is designed to cope with abnormal flows. TW have been contacted to establish if the CCTV has been completed – they have been unable to provide a response.

4.4 Application for Grant Aid

The District Council has distributed a range of financial support to the residents of district in the form of;

- Emergency Flood Relief Grant Aid of £250
- 'Hardship' Grants
- Red Cross Grants

To date the owners of 28 residential properties Alvescot have received Emergency Flood Relief Grant Aid, however it is acknowledge this is not the total number of properties affected in the Parishes as some owners have been reluctant to claim.

Whilst the Emergency Flood Relief Grant Aid was not paid to industrial and commercial properties, the Council did provide advice and support to local business affected by the flooding on funding available from Business Link and other organisations.

5.0 PROBLEMS AND CAUSES

5.1 Plans

Figure 1, which can be found in appendix 2, shows areas in Alvescot where properties flooded in July 2007 and where owners have made claims for grant assistance. The flooding can be broadly split into three areas being:

- Area 1: Mill Lane
- Area 2: Station Road
- Area 3: Lower End

The map shows areas where properties were affected by flooding in July 2007, overlaid with 2008 Environment Agency Flood Zones.

- 1% probability of flooding - Flood Zone 3 (previously referred to as 1 in 100 year flooding)
    - This is the area defined by the EA as the extent of a flood with a 1 per cent chance happening in any year. This is the high probability risk zone.

- 0.1% probability of flooding – Flood Zone 2 (previously referred to as 1 in 1000 year flooding)
    - This is the area defined by the EA as the extent of a flood with a 0.1 per cent chance happening in any year. This is the medium probability risk zone.

5.2 Area 1 – Mill Lane

In 2007, 3 properties located in Mill Lane claimed flood damage grants. These properties are located in Environment Agency Flood Zone 1 being at low risk of flooding with a less than 0.1 % (1 in 1000 year) annual probability of river flooding in any one year.

The Shill Brook flows in a south easterly direction to the north of Mill Lane. As the watercourse exits the RAF Brize Norton airbase, the channel divides in two comprising a Mill stream and original watercourse. These channels again converge to the south of Mill house, on the edge of the Parish.

The Shill Brook collects runoff from a rural catchment to the west, with an area of 7.03km^2 (calculated using FEH) and from a partly urbanised catchment including parts of Carterton to the north with a catchment area of 29.81km^2 (calculated using FEH).

The cause of flooding at this location is one, or a combination of the following:

5.2.1 The Shill Brook

The Shill Brook is located to the north of Mill Lane and flows via a mill race in close proximity to property on the lane and underneath the Mill House itself. During July 2007, the Shill Brook and the mill race burst its banks and flooded property at the end of Mill Lane.

5.2.2 Overland Flow

Mill Lane is located in a natural flow path to the Shill Brook and properties located on the south of the Lane are affected by overland flow from the rear of the properties and adjacent farmland.

Direct overland flow occurs when the ground either becomes fully saturated, preventing any percolation into the upper layers of soil, or where the rainfall intensity and rate is greater than the percolation rate of the receiving ground. Both result in sheet runoff, or water flowing directly off the surface of the land.

5.2.3 Road Runoff

Properties at the end of Mill Lane are located at the bottom of a hill. During periods of heavy rainfall, road runoff flows along the road surface and where properties have door sill levels at or below the road level, water enters property.

A site visit highlighted an overgrown field ditch located on Mill Lane on the right hand side of the road as you travel down the hill towards the Mill House.

Discussion with local residents also highlighted that historically a ditch ran in front of the cottages on the right hand side of the Lane as you travel towards Mill house.

5.3 Area 2 – Station Road

15 properties flooded on Station Road in July 2007. All of these properties are located in the 2007 Environment Agency Flood Zone 1, comprising of land having less than 0.1% probability of flooding (less than 1 in 1000 year) of flooding from rivers.

The cause of flooding at this location is one, or a combination of the following

5.3.1 Overland Flow

Some properties on Station Road, especially those located towards the western extend of the village boundary were inundated from flood water running off adjacent farmland.

Direct overland flow occurs when the ground either becomes fully saturated, preventing any percolation into the upper layers of soil, or where the rainfall intensity and rate is greater than the percolation rate of the receiving ground. Both result in sheet runoff, or water flowing directly off the surface of the land.

5.3.2 Groundwater ingress

Some of the older properties on Station Road have been flooded from groundwater ingress. Many of the older properties were built with stone floors without foundations or damp proof courses and groundwater therefore can rise through property. This is exacerbated when poor local drainage means that surface water can not flow away but instead infiltrates to the groundwater which in turn rises to inundate property.

Groundwater flooding occurs as a result of water rising up from the underlying rocks or from water flowing from abnormal springs. This tends to occur after much longer periods of sustained high rainfall. Higher rainfall means more water will infiltrate into the ground and cause the water table to rise above normal levels. Groundwater tends to flow from areas where the ground level is high, to areas where the ground level is low. In low-lying areas the water table is usually at shallower depths anyway, but during very wet periods, with all the additional groundwater flowing towards these areas, the water table can rise up to the surface causing groundwater flooding.

5.3.3 Road Runoff

During periods of heavy rainfall, ponding occurs at low points on the highway. As the rainfall intensity increases, surface water drains and gullies begin to surcharge and water flows along the road surface increasing in depth. Where properties have door sill levels at or below the road level, water enters property. This has occurred at some properties along Station Road. Wash from passing vehicles exacerbates this problem.

5.4 Area 3 – Lower End

In 2007, 9 properties located at Lower End claimed flood damage grants (to include property to the junction with Station Road). These properties are located in Environment Agency Flood Zone 1 being at low risk of flooding with a less than 0.1 % (1 in 1000 year) annual probability of river flooding in any one year.

There is no watercourse located in close proximity to Lower End.

The cause of flooding is one, or a combination of the following:

5.4.1 Thames Water Pumping Station

The Thames Water Pumping Station located opposite the Old Rectory Farmhouse at Lower End has caused flooding to the lane and internal flooding to property on a number of occasions since July 2001 as follows:

July 2001	Major flooding - failure of generator
August 2002	Flooding of the lane – caused by a blockage
January 2003	Flooding of lane
March 2004	Flooding of manhole in lane – caused by a blockage
December 2004	Flooding of lane (twice in two weeks)
July 2007	Leak from pumping station flooding lane
July 2007	Flooding of property

Thames Water have been out to site on a number of occasions and have stated that blockages that have caused flooding on at least two occasions may have been caused by a 'dog leg' in the piped system on its approach to the pumping station. A CCTV survey is due to be completed in 2008 to provide more information on the design in order that TW can provide a solution.

With regard to the provision of a standby generator, TW are unable to commit to this as their expenditure has to be prioritised.

TW have also stated that the pumping station at Lower End is designed to cope with abnormal flows. However, bubbling of foul water is a regular occurrence from manhole covers at Lower End which suggest that the system is not currently functioning to its full capacity.

5.4.2 Highway Drainage

The Highway Drainage at Lower End is a piped system with gullies at regular intervals. Where drainage meets the end of the lane, it enters a piped system crossing farmland to the south where it crosses the abandoned railway and discharges to the Clanfield brook. There are six manholes crossing the fields prior to its outfall at the Clanfield Brook.

Local residents have inspected the highway drainage at the point where it turns to cross farmland. This has shown that two pipes with estimated diameters of 300mm and 450mm join the system to connect to the drainage crossing farmland. Local farmers state that the downstream system crossing farmland only has a diameter of 150mm to connect to the Clanfield Brook.

Flooding at this location has been attributed to two issues related to the highway drainage:

- Lower End is located in a low point of the catchment. During periods of heavy rainfall, road drainage is unable to cope with volumes of water due to inadequate capacity of the outfall connection to the Clanfield Brook. This prevents drainage of water and instead it ponds in Lower End, increasing in depth until property is inundated.
- As the rainfall intensity increases, surface water drains and gullies begin to surcharge and water flows along the road surface increasing in depth. Where properties have door sill levels at or below the road level, water enters property. This has been excaserbated by insufficient maintenance of the highway drainage to include the gullies located in Lower End and the piped system which crosses farmland to link the highway drainage to The Clanfield Brook. This is reported to be partially blocked.

5.4.3 Surface water flooding

There has been concern that new development located in the parish of Alvescot has not incorporated surface water drainage and instead discharges surface water onto the highway. This has contributed to flooding of downstream property.

Floodwater experienced at the junctions of Well Lane and Main Road with Bampton Road in Curbridge during July 2007 was attributed to overland flow originating as surface water runoff from surrounding agricultural fields. Multiple houses along Bampton Road were also flooded and it was believed by residents that blocked gullies and highly vegetated highway drains and ditches alongside the road exacerbated the impact of the flood event.

Two properties adjacent the A4095 were also flooded during heavy rainfall events of the 3rd June 2008.

6.0 OPTIONS

The following table shows the possible options available for flood alleviation schemes throughout the Parish, and their potential effectiveness, as assessed by the District Council Engineers. The areas affected by flooding within the Parish have been given unique area numbers, i.e. Area 1. Several options for flood alleviation projects are identified for each area as "Actions" or "Options".

Many of these options will require further detailed investigation along with the agreement of the responsible landowner, identification of budget and a cost benefit analysis to be carried out before they could be implemented.

Some of the options shown are also mutually exclusive, that is if one option is carried out then another will not be necessary, to find if this is the case for an option, please look at the detailed description in the Conclusions and Recommendations Section (7.0).

If you require further information regarding a particular option, please contact the agency that would be responsible for implementation of the proposal, where this has been shown, using the contact information at the top of the column. If no contact details are shown, there may be a private landowner responsible. If this is the case the District Council will ensure that private landowners are made aware of their responsibilities.

Parish Flood Options

Alvescot

Version 1 – May 2008

Option ref	Flood Overview	Description of work required					Key issues			Comments
	Options	**Environment Agency**	**Oxfordshire County Council**	**Thames Water**	**WODC**	**Private (riparian)**	**Effectiveness**	**Affects on adjacent land**	**Cost**	
		For queries Tel 08708 506 506 Or email enquiries@environment-agency.gov.uk	Main Switchboard: 0845 310 1111 Or e-mail: online@oxfordshire.gov.uk	Enquiries: 0845 200 800	Switchboard: 01993 861 000					
Area 1 – Mill Lane										
	The Shill Brook **As water levels in the Shill Brook and the mill race rose, the banks were breached and water flowed across farmland to inundate properties on Mill Lane.**									
A	Installation of a flow control device (e.g. sluice gate or weir structure) on the mill race. This will enable a controlled flow of water down the mill race but during times of flood, the flood flows will be diverted to the original Shill Brook Channel where there are no properties liable to flood.	A representative of the EA (David Mc Knight) has walked the Shill Brook in this location. He feels that while this may work during lower return period events, during extreme events, the two channels become one and flooding would therefore still occur on Mill Lane. In order to establish at what point the channels join across the floodplain, hydraulic modelling would be required. The watercourse is main river therefore, the EA are to assess feasibility of this option.			WODC to provide co-ordination role	Local landowners who front the watercourse are happy for the Shill Brook to take flood flows as apposed to the Mill race. Control device to be funded by Riparian owners.	Would divert flood flows away from existing property on Mill Lane.	Adjacent farmland to the Shill Brook would have an increased flood risk.	£20,000 to £50,000	EA and Landowners have been approached regarding this option.
B	Carry out maintenance of Shill Brook	Shill Brook is a 'main river' EA to carry out maintenance. Consent required if anyone else is to complete work.			WODC to provide co-ordination role	Riparian owners to trim vegetation on banks of Brook	Will increase channel capacity during times of flood	Will contain flood waters in channel for longer and reduce flooding of surrounding land	Up to £5,000	On inspection (May 2007) the channel appeared to be clear and well maintained. Trash screens upstream of Mill Lane are cleared by RAF Brize Norton. These have not historically been well maintained, reducing flows to Mill Lane area. RAF Brize Norton have a new maintenance regime in place to ensure regular clearance of trash screens.
C	Flood resilient measures to properties in the 0.1% probability (1 in 1000 year floodplain)	The EA website contains reference information on flood resilient measures to properties.			WODC to provide a co-ordination role	Homeowners to provide protection against flooding to their properties e.g. flood boards, flood proofing of exterior walls, sandbags, air brick covers, water resistant door frames	Only effective if defences are put in place before the water level rises.	None	Up to £5,000	Homeowners have not been approached regarding this option Older properties are prone to water rising through floors due to their construction.

Option ref	Flood Overview	Description of work required					Key issues			Comment
	Options	**Environment Agency**	**Oxfordshire County Council**	**Thames Water**	**WODC**	**Private (riparian)**	**Effectiveness**	**Affects on adjacent land**	**Cost**	
		For queries Tel 08708 506 506 Or email enquiries@environment-agency.gov.uk	Main Switchboard: 0845 310 1111 Or e-mail: online@oxfordshire.gov.uk	Enquiries: 0845 200 800	Switchboard: 01993 861 000					
Area 1 – Mill Lane (cont…)										
D	EA to lower the channel bed in the Mill Race from RAF Brize Norton to its confluence with the Shill Brook	EA to carry out de-silting of channel			WODC to provide co-ordination role		Will increase channel capacity and reduce potential flood risk	Will improve local land drainage	Up to £5,000	
E	Raise bank levels on right bank of Mill Race to increase level of protection to property.	EA to carry out works as is main river. Further consultation required			WODC to provide co-ordination role		Will reduce risk of flooding to property on Mill Lane		£5,000 to £20,000	The close proximity of the watercourse to property could increase the danger should any raised bank be breached by flood waters. The raised banks will prevent surface water from returning to the watercourse.
F	Provision of a flood storage area upstream of Alvescot to attenuate flows in Shill Brook during times of flood	EA to carry out feasibility and works			WODC to provide co-ordination role		Will reduce flood flows to Alvescot and Black Bourton	Increased flooding of adjacent farmland		Limited space means that storage would have to be provided upstream of the RAF Brize Norton culvert. Landowners have not been approached. This could be used to mitigate flooding in Black Bourton as well. This may be affected by upstream development in Carterton.
	Highway Drainage and overland flow **Water from surrounding farmland flowed onto the highway where existing drainage was unable to cope with the volumes of water.**									
G	Maintain existing field drainage ditch located on the right hand side of Mill Lane as travelling downhill to the Mill House.		OCC to maintain ditch if it is shown to be their responsibility as highway drainage.		WODC to provide co-ordination role and to establish ownership of this field ditch.	Riparian owner to clear and maintain ditch if WODC show them to be responsible under the land drainage act.	Will help to reduce overland flow arriving on Mill Lane as the ditch will 'catch' some of the flood waters from adjacent farmland and the lane	Will improve local land drainage	Up to £5,000	This ditch was historically maintained by residents of Mill Lane.
H	Re-instate drainage channel located at the front of property abutting Mill Lane on the right hand side on the approach Mill House				WODC to provide co-ordination role.	Riparian owners to re-instate drainage channel running under footpath access to front doors.	Re-instating drainage channel will allow drainage of the highway and reduce flood risk to property.	Works will improve local land drainage.	Up to £5,000 for each crossing.	Local residents have not been approached regarding this suggestion.
I	Install a new land drainage ditch at the rear of properties along Mill Lane (on the right hand side as you approach Mill house)				WODC to provide co-ordination role and ensure maintenance of ditch	Riparian owner to construct ditch to drain the adjacent farmland so as to prevent flooding to property downstream and direct water to Shill	Will greatly reduce overland flow to rear of properties on southern side of Mill Lane	Works will improve local land drainage.	Up to £5,000 to dig the ditch	Riparian owner will be responsible for maintenance of ditch.

						Brook downstream				
Option ref	**Flood Overview**		**Description of work required**				**Key issues**			**Comment**
	Options	**Environment Agency**	**Oxfordshire County Council**	**Thames Water**	**WODC**	**Private (riparian)**	**Effectiveness**	**Affects on adjacent land**	**Cost**	
		For queries Tel 08708 506 506 Or email enquiries@environment-agency.gov.uk	Main Switchboard: 0845 310 1111 Or e-mail: online@oxfordshire.gov.uk	Enquiries: 0845 200 800	Switchboard: 01993 861 000					
Area 1 – Mill Lane (cont…)										
J	Create flood holes in the stone wall on the northern side of Mill Lane to allow flood water to return to the Shill Brook without flowing down Mill Lane past the Mill House				WODC to confirm ownership of wall	Owner of wall to carry out works	Flood water will return to the Shill Brook quicker	Will reduce flooding of lane	Up to £5,000	This would only be suitable during smaller return period flood events when the Shill Brook isn't in flood.
K	Flood resilient measures to properties in the 0.1% probability (1 in 1000 year floodplain)	The EA website contains reference information on flood resilient measures to properties.			WODC to provide a co-ordination role	Homeowners to provide protection against flooding to their properties e.g. flood boards, flood proofing of exterior walls, sandbags.	Only effective if defences are put in place before the water level rises.	None	Up to £5,000	Homeowners have not been approached regarding this option Older properties are prone to water rising through floors due to their construction.
L	Changes to land management e.g. contour ploughing to reduce direct runoff from farmland entering Mill Lane from the upstream catchment	EA to advise landowner of land management techniques to reduce runoff or store water prior to flowing onto the lane at Lower End			WODC to provide a co-ordination role	Landowner/occupier of fields to change farming technique to increase infiltration.	Studies have shown that this has had mixed results	There will be a change in land use in the upstream catchment	Up to £5,000	Landowners in the upstream catchment have not been approached. It may be possible for landowners/farmers to obtain environmental grants to plant hedgerows.
Area 2 – Station Road										
	Overland Flow **During periods of intense rainfall, overland flow from farmland flows into surrounding property.**									
A	Construct land drainage ditches along hedgerows in farmland to the north of Station Road at Manor Farm and at Butlers Court Farm				WODC to provide co-ordination role and to ensure that ditch maintenance is carried out	Riparian owner to build ditches on field boundaries where possible to provide land drainage and prevent flooding of property downstream	Will reduce flood risk to property	Will improve land drainage	Up to £5,000	Landowners have not been approached regarding this potential solution.
B	Changes to land management e.g. contour ploughing to reduce direct runoff from farmland entering Lower End from the direction of Red Gate cottages	EA to advise landowner of land management techniques to reduce runoff or store water prior to flowing onto the lane at Lower End			WODC to provide a co-ordination role	Landowner/occupier of fields to change farming technique to increase infiltration.	Studies have shown that this has had mixed results	There will be a change in land use in the upstream catchment	Up to £5,000	Landowners in the upstream catchment have not been approached. It may be possible for landowners/farmers to obtain environmental grants to plant hedgerows.
C	Flood resilient measures to properties in the 0.1% probability (1 in 1000 year floodplain)	The EA website contains reference information on flood resilient measures to properties.			WODC to provide a co-ordination role	Homeowners to provide protection against flooding to their properties e.g. flood boards, flood proofing of exterior walls, sandbags.	Only effective if defences are put in place before the water level rises.	None	Up to £5,000	Homeowners have not been approached regarding this option Older properties are prone to water rising through floors due to their

										construction.
Option ref	**Flood Overview**		**Description of work required**					**Key issues**		**Comment**
	Options	**Environment Agency**	**Oxfordshire County Council**	**Thames Water**	**WODC**	**Private (riparian)**	**Effectiveness**	**Affects on adjacent land**	**Cost**	
		For queries Tel 08708 506 506 Or email enquiries@environment-agency.gov.uk	Main Switchboard: 0845 310 1111 Or e-mail: online@oxfordshire.gov.uk	Enquiries: 0845 200 800	Switchboard: 01993 861 000					
Area 2 – Station Road (cont…)										
	Groundwater Ingress **Some properties on Station Road experienced flooding from groundwater ingress. Older properties may have stone flooring which as the groundwater level rises allows seepage of floodwater**									
D	Individual properties to install flood resilient measures. This may include 'tanking' - this involves sealing the room with a water-proof membrane.	The EA groundwater teams may be able to provide advice on prevention of groundwater ingress to property				Riparian owners to install flood resilient measures to property.	Will prevent groundwater ingress to rooms that have been 'tanked'	None		Older properties are prone to water rising through floors due to their construction.
	Following periods of intense rainfall (such as July 2007), surface water drainage and road gullies surcharge as a result of capacity exceedence or blockages. Surface water flooding occurs of road and low lying properties									
E	Undertake blockage and siltation inspections of road gullies and associated drainage along Station Road. Where necessary, undertake jetting or other clearance measures.		OCC to organise and undertake inspection as part of their regular maintenance regime		WODC to provide co-ordination where required		This could improve drainage during high intensity rainfall events.	Potentially reduce volume of water flowing onto adjacent land.	£5,000 to £20,000 per year	OCC have installed new surface water drainage along Station road where drainage had collapsed
F	Create a kerb line to prevent water from flowing from the highway into property		OCC to complete kerbing works on Station road to prevent flooding to property. Where driveway access is required, these should be ramped.		WODC to provide co-ordination role		Will prevent flooding of property from highway runoff during lower return period flood events	None	£5,000 to £20,000	
Area 3 – Lower End										
	Sewer flooding has affected a number of properties in Lower End. This has been attributed to the TW Sewage Pumping Station at Lower End being overwhelmed during periods of high intensity rainfall									

A	Removal of 'dog leg' in sewage system on approach to TW pumping station which has led to flooding			TW have agreed to carry out a CCTV survey of the section of pipeline that is concerned with view to carry out corrective action. Line has to be cleaned to allow this which has been completed in spring 08		Local property owners to contact TW every time flooding occurs to highlight problem on TW priority list	Will remove 'dog leg' and blockage point which should reduce flooding risk due to 'mis-use' of the foul system	Reduced flooding	£20,000 to £50,000	TW agreed to complete CCTV survey in May 2008 – work is on-going
Option ref	**Flood Overview**	**Description of work required**					**Key issues**			**Comment**
	Options	**Environment Agency**	**Oxfordshire County Council**	**Thames Water**	**WODC**	**Private (riparian)**	**Effectiveness**	**Affects on adjacent land**	**Cost**	
		For queries Tel 08708 506 506 Or email enquiries@environment-agency.gov.uk	Main Switchboard: 0845 310 1111 Or e-mail: online@oxfordshire.gov.uk	Enquiries: 0845 200 800	Switchboard: 01993 861 000					
Area 3 – Lower End (cont…)										
B	Foul water flooding has occurred at Lower End following power failure at the pumping station. Supply standby generator			TW to provide a standby generator for periods where there is loss of power at the pumping station	WODC to provide co-ordination role		Will prevent a repeat of the flooding prior to July 2000 when a power failure led to internal flooding of property	None	£5,000 to £20,000	Further consultation required. TW have said that they have to prioritise their expenditure. TW have been asked to look into the provision of a standby generator for the wider area which can be called upon if power was to fail in a parish. Letter dated 24/07/01 WODC to approach TW with regard to use of a standby generator
C	Foul water flooding has occurred during periods when there has been no heavy rainfall. TW to carry out modelling study of capacity of pumping station.			TW to carry out capacity check of pumping station at Lower End with view to upgrade if required.			Will remove flood risk due to under capacity of system	Reduced flood risk	Up to £5,000 modelling study £50,000 to £100,000 upgrade	TW stated that the pumping station is currently sized to deal with abnormal flows. A capacity check is especially important with the inclusion of Kencot to this system
D	Foul water has mixed with highway drainage TW to completed CCTV survey at Lower End to assess linkage of system to highway drainage			TW to carry out CCTV survey in Lower End to check linkage of system to highway drainage and carry out any corrective action required.			Will prevent contamination of surface water system with foul water	Reduced flooding	Up to £5,000 CCTV survey £20,000 to £50,000 corrective action	TW have not been approached regarding this option
E	Individual properties to fit anti-backflow valves to private foul connections			TW to supply anti-backflow valves to properties where backing up of foul water is a problem.	WODC to provide co-ordination role if required	Property owners to get in touch with Thames Water regarding supply of valves	Will prevent backing up of foul water into properties	None	Up to £5,000	TW have supplied valves to properties in Clanfield that suffer foul flooding from backing up through the system
	Following periods of intense rainfall (such as July 2007), surface water drainage and road gullies surcharge as a result of capacity exceedence or blockages. Surface water flooding occurs of road and low lying properties									

F	Undertake blockage and siltation inspections of road gullies and road drainage in areas highlighted as having had surface water flooding problems. Where necessary, undertake jetting and other clearance measures		OCC to organise and undertake maintenance of existing highway drainage at Lower end as part of their maintenance regime. This must include the system outfall to the Clanfield Brook							Local residents feel that OCC clear gullies ever 2/3 years, not just over once a year and they do not clear the outfall to Clanfield Brook. OCC do respond well when called out.
Option ref	**Flood Overview**	**Description of work required**					**Key issues**			**Comment**
	Options	**Environment Agency**	**Oxfordshire County Council**	**Thames Water**	**WODC**	**Private (riparian)**	**Effectiveness**	**Affects on adjacent land**	**Cost**	
		For queries Tel 08708 506 506 Or email enquiries@environment-agency.gov.uk	Main Switchboard: 0845 310 1111 Or e-mail: online@oxfordshire.gov.uk	Enquiries: 0845 200 800	Switchboard: 01993 861 000					
Area 3 – Lower End (cont…)										
G	OCC to carry out a survey of the existing piped network across farmland to the Clanfield Brook		OCC to check the function of the piped system linking highway drainage at Lower End to the Clanfield Brook and upgrade size of pipe work if required. The existing system should be cleaned out if required. Feasibility of replacing the existing piped system with ditching should be looked into – it is assumed that levels will not allow this.		WODC to provide co0ordination role		Will ensure that the existing highway drainage system is working to its full potential	Reduced flood risk to adjacent land	Up to £5,000 to clean the piped system out	Local residents have lifted the inspection chambers which show two pipes approximately 300mm and 450mm diameter connecting to the outfall. Local farmers believe the outfall pipe across farmland is only 150mm diameter and partially blocked.
H	Changes to land management e.g. contour ploughing to reduce direct runoff from farmland entering Lower End from the direction of Red Gate cottages	EA to advise landowner of land management techniques to reduce runoff or store water prior to flossing onto the lane at Lower End			WODC to provide co0ordination role	Landowner/occupier of fields to change farming technique to increase infiltration	Studies have shown that this has mixed results	There will be a change in land use on the upstream catchment	Up to £5,000	Landowners in the upstream catchment have not been approached. It may be possible for landowners/farmers to obtain environmental grants to plant hedgerows.
I	Flood resilient measures to properties in the 0.1% probability (1 in 1000 year floodplain)	The EA website contains reference information on flood resilient measures to properties.			WODC to provide a co-ordination role	Homeowners to provide protection against flooding to their properties e.g. flood boards, flood proofing of exterior walls, sandbags.	Only effective if defences are put in place before the water level rises.	None	Up to £5,000	Homeowners have not been approached regarding this option Older properties are prone to water rising through floors due to their construction.
J	At least four new properties in lower end discharge storm water directly to the road thereby increasing flow to highway drainage and increasing flood risk.		OCC to take steps to rectify lack of soakaways and connection to highway drainage		WODC to provide co-ordination role	Homeowners to install own private soakaways			Up to £5,000	Letter dated 300701 OCC to ask area liaison officer David Fettes to look into drainage discharge from upstream dev Letter dated 24/07/01 WODC to look into planning application W2001/0511 regarding drainage connection

7.0 CONCLUSIONS AND RECOMMENDATIONS

7.1 Area 1 – Mill Lane

Historically, there have been problems of flooding in the upstream catchment of the Shill Brook including Carterton. Any development in the upstream catchment should consider any potential effects to development located downstream in Alvescot.

7.1.1 Maintenance

The Shill Brook is enmained and the EA are responsible for channel maintenance. On inspection in (May 2007) the channel appeared clear and was flowing freely.

Directly upstream of Mill Lane, the Shill Brook flows through RAF Brize Norton. It has been observed in the past that trash screens at the exit from RAF Brize Norton have not been regularly maintained and indeed on inspection there was a substantial amount of debris built up. However, the RAF now have a maintenance regime in place to include clearance of trash screens.

The following on-going maintenance is recommended

- **Option B** - The Shill Brook is main river and it is the responsibility of the EA to carry out channel maintenance
- **Option G** - Maintain existing field drainage ditch located on the right hand side of Mill Lane as travelling downhill to the Mill House

7.1.2 Flood Defence Improvement Schemes

The following flood defence improvement schemes are recommended:

Immediate (under 1 year)

- **Option A** - Installation of a flow control device (e.g. sluice gate or weir structure) on the mill race. This will enable a controlled flow of water down the mill race but during times of flood, the flood flows will be diverted to the original Shill Brook Channel where there are no properties liable to flood
- **Option C & K** - Flood resilient measures to properties in the 0.1% probability (1 in 1000 year floodplain)
- **Option I** - Install a new land drainage ditch at the rear of properties along Mill Lane (on the right hand side as you approach Mill house)
- **Option J** - Create flood holes in the stone wall on the northern side of Mill Lane to allow flood water to return to the Shill Brook without flowing down Mill Lane past the Mill House

Mid-Term (under 1 -2 years)

- **Option D** - EA to lower the channel bed in the Mill Race from RAF Brize Norton to its confluence with the Shill Brook
- **Option H** - Re-instate drainage channel located at the front of property abutting Mill Lane on the right hand side on the approach Mill House
- **Option E** - Raise bank levels on right bank of mill race to increase level of protection to property

Long-Term (3 years or more)

- **Option L** - Changes to land management e.g. contour ploughing to reduce direct runoff from farmland entering Mill Lane from the upstream catchment
- **Option F** - Provision of flood storage area upstream of Alvescot to attenuate flows in Shill Brook during times of flood

7.2 Area 2 – Station Road

7.2.1 Maintenance

The following on-going maintenance is recommended:

- **Option E** – OCC to undertake blockage and siltation inspections of road gullies and associated drainage along Station Road. Where necessary, undertake jetting or other clearance measures.

7.2.2 Flood Defence Improvement Schemes

The following flood defence improvement schemes are recommended:

Immediate (under 1 year)

- **Option A** - Riparian owner to construct land drainage ditches along hedgerows in farmland to the north of Station Road at Manor Farm and at Butlers Court Farm.
- **Option C** - Flood resilient measures to properties in the 0.1% probability (1 in 1000 year floodplain)
- **Option F** - Create a kerb line to prevent water from flowing from the highway into property

Mid-Term (under 1 -2 years)

- **Option D** - Individual properties to install flood resilient measures (groundwater ingress). This may include 'tanking' - this involves sealing the room with a water-proof membrane.

Long Term (3 years or more)

- **Option B** - Changes to land management e.g. contour ploughing, ridge and furrow to reduce direct runoff from farmland entering Lower End from the direction of Red Gate cottages

7.3 Area 3 – Lower End

Regular surface water and foul water flooding are experienced at Lower End. Both problems can be greatly improved through works by Thames Water to remove the 'dog leg' in the system and OCC by increasing the outfall diameter to the Clanfield Brook. These works should be carried out as a matter of priority due to the threat to public health.

7.3.1 Maintenance

The following ongoing maintenance is recommended:

- **Option F** - Undertake blockage and siltation inspections of road gullies and road drainage in areas highlighted as having had surface water flooding problems. Where necessary, undertake jetting and other clearance measures

7.3.2 Flood Defence Improvement Schemes

The following flood defence improvement schemes are recommended:

Immediate (under 1 year)

- **Option A** - Removal of 'dog leg' in sewage system on approach to TW pumping station which has led to flooding
- **Option B** - TW to provide a standby generator for periods where there is loss of power at the pumping station
- **Option E** - Individual properties to fit anti-backflow valves to private foul connections
- **Option G** - OCC to check the function of the piped system linking highway drainage at Lower End to the Clanfield Brook and upgrade size of pipe work if required. The existing system should be cleaned out if required. Feasibility of replacing the existing piped system with ditching should be looked into – it is assumed that levels will not allow this.
- **Option I** - Flood resilient measures to properties in the 0.1% probability (1 in 1000 year floodplain)

Mid-Term (under 1 -2 years)

- **Option C** - TW to carry out capacity check of pumping station at Lower End with view to upgrade if required.
- **Option D** - TW to carry out CCTV survey in Lower End to check linkage of system to highway drainage and carry out any corrective action required.

Long Term (3 years or more)

- **Option H** - Changes to land management e.g. contour ploughing to reduce direct runoff from farmland entering Lower End from the direction of Red Gate cottages
- **Option J** – OCC/WODC to investigate discharges of surface water from property to the highway

Appendix 1: Photographs

Area 1 - Mill Lane

Photo 1 – Mill Lane looking towards Mill House, July 2007

Photo 2 – Mill Lane, looking from Mill House back up the Lane – July 2007

Area 1 - Mill Lane (cont…)

Photo 3 – Flood waters from farmland at the rear of properties on Mill Lane – July 2007

Photo 4 – Ditching along Mill Lane.

Area 1 - Mill Lane (cont…)

Photo 5 – Highway drainage gulley located at the end of Mill Lane, connects to the Shill Brook.

Area 2 – Station Road

Photo 6: Station Road with Mill Lane on the left. This photo shows the low kerb line and level of property in relation to Station Road.

Area 2 – Station Road (cont…)

Photo 7 - Station Road - :Looking towards Black Bourton – July 2007

Photo 8 – OCC highway drainage being installed on Station Road – May 2008

Area 3 – Lower End

Photo 9 - Looking towards the TW pumping station at Lower End

Photo 10 - Driveway to Stone Cottage, Lower End

Area 3 – Lower End (cont…)

Photo 11 - Flooding of Lower End

Photo 12 - Flooding Lower End looking towards Station Road

Area 3 – Lower End (cont…)

Photo 13 – Manhole surcharging at Lower End

Photo 14 –Lower End looking towards Station Road

Area 3 – Lower End (cont…)

Photo 15 – Station Road looking down the lane to Lower End. This shows that the levels of the road mean that all of the surface water from this location will collect in the low point at Lower End.