



WEST OXFORDSHIRE
DISTRICT COUNCIL

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Parish Flood Report: **Westwell**

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 powers¹ 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 riparian² land owner, and permissive powers¹ 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, 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

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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
 - £1,500 (£250 for six properties) in Westwell
- 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, 1 report for Westwell

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 Westwell 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 Westwell during July 2007 and potential mitigating solutions.

Westwell is a rural parish located approximately two miles to the southwest of Burford and three miles northwest of Carterton. There is one watercourse flowing through the village, an upper reach of the Shill Brook.

Visual walkover surveys have been undertaken in the flooded areas and properties and a meeting held with affected residents. WODC have a record of six applications for Grant Aid in Westwell.

Flooding experienced in 2007 in Westwell was caused by excessive overland flow and surface water runoff from the higher parts of the catchment, which were already saturated following prolonged rainfall. This resulted in the Shill Brook flowing out of bank. This was exacerbated by the overgrown nature of the stream reducing its conveyance as well as surcharged drainage in the west of the village. In addition, this drainage flooding along the road to the west of the village is reported by residents to occur more regularly than it did previously.

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 schemes and programme, are shown in Section 6.

This report also includes an Options Summary, Appendix 1 shows photographs taken during the events in 2007 and during the site visit in 2008, Appendix 2 showing maps of the area and Environment Agency Flood Zones and Appendix 3 is a Glossary.

4.0 SURVEY

4.1 Description of Area

Westwell is a small village located approximately two miles to the southwest of Burford and three miles northwest of Carterton. The Parish itself is rural in nature and surrounded by predominantly agricultural land. A small stream flows through the village in a north-south direction; this is an upper reach of the Shill Brook. The Shill brook is not an emained watercourse in the vicinity of Westwell.

The Shill Brook rises in the fields to the immediate north of the village, where it is defined by a small ditch. From here it flows south past a number of residential properties and is culverted beneath the road that runs through the village. To the immediate north of the road, the stream is joined by the inflow from the pond located in the village centre, to the west of the stream. It is believed that this pond is sourced from surface water flowing from the higher areas to the west, i.e. the Rectory.

The stream re-emerges adjacent to the property to the south of the road, before flowing through a culvert beneath a small track. From here, the stream continues to flow south through agricultural fields and beneath a small road. Further south (downstream) of the small road, the stream flows into a series of ponds located at the bottom of a valley to the north of Holwell, and continues in an easterly direction before joining the Shill Brook at Signet.

Using the Flood Estimation Handbook (FEH), the catchment area of the Shill Brook to where it passes through a culvert beneath the road to the south of the village is calculated to be 9.45km².

Surface water generated from the main road running through the village is collected by a surface water sewer located beneath the road that follows the natural topography and flows to the east. This surface water sewer may be connected to the Shill Brook, however, no evidence of this connection was found during the site visit.

4.2 Survey Method

A visual walk-over survey of properties affected by the July 2007 flooding has been undertaken. A visual inspection of the Shill Brook and surrounding area has also been made.

4.3 Meetings

A summary of meetings about Westwell flooding in July 2007 is given in Table I below

Table I Summary of meetings about flooding in Westwell

Date	Location	Description
11.07.08	Meeting with residents regarding flooding issues	<ul style="list-style-type: none">• Residents explained the events in July 2007• The main cause of flooding was from overland flow on already saturated ground causing the Shill Brook to overtop• The culvert beneath the road in the village surcharged and resulted in water flowing into the driveway of the property opposite• The surcharging culvert along with the overgrown and silted nature of the stream led to water backing up and flooding the properties to the north of the road• Road to the west of the town flooded partly due to surcharging highway drains

		<ul style="list-style-type: none"> • Overland flow and surcharging drainage caused the wall between the road and the Rectory to breach, causing further flooding • Residents outlined that the highway drains surcharge much more regularly now than they did previously, prior to a number of property extensions and conversions • The village pond also surcharged, further exacerbating flooding in the village centre • Residents outlined action already taken such as clearing and dredging of the watercourse in some places as well as increasing capacity of the village pond
September/ October 2007	Various meetings with the local residents and Parish Council by WODC	<ul style="list-style-type: none"> • Residents discussed various measures that could be undertaken to reduce the risk of flooding in the village • Measures include clearing the watercourse in certain areas, increasing the capacity of the village pond and clearing the highway drains on the road to the west of the village

WODC has liaised with the Environment Agency and Oxfordshire County Council as part of this report. As none of the flooding was caused by foul drainage or water mains, Thames Water were not consulted as part of this investigation.

Details of all conversations in July 2008 are included in Table 2

Table 2 Summary of telephone calls made with the EA and OCC

Company	Comments
EA	<p>Phone call to Phil Garvey at the Wallingford Office regarding flooding in Westwell in 2007. Phil confirmed that this stretch of the Shill Brook is a non-main river (Ordinary Watercourse) and therefore outside of the EA's jurisdiction. The extent of the main river extends to where the river flows through a culvert beneath the road to the south of the village. As a result, the majority of the measures that would be undertaken on the watercourse would be done so by riparian owners, although the EA could offer some advice.</p> <p>The EA also confirmed that they will be undertaking modelling of the Shill Brook, however, it is unlikely to be undertaken at Westwell, due to it not being a main river.</p>
OCC	<p>Phone call to Gordon Hunt at OCC. Gordon confirmed that OCC have replaced the wall between the Rectory and the road to the west of the town. The issues regarding the silted drains were raised and Gordon confirmed that OCC were aware of the issues within the generic area and are considering their actions to deal with this.</p>
TW	<p>There are no records of sewer flooding in Westwell and TW have not been contacted.</p>

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 six residential properties in Westwell have received Emergency Flood Relief Grant Aid, however it is acknowledged this is not the total number of properties affected in the Parish 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

Maps in Appendix 2 shows areas in Westwell where properties flooded in July 2007 and where owners have made claims for grant assistance. The photographs included in Appendix 1 (specifically Appendix 1a) show the flood events in July 2007. The Parish has been considered as three areas, as follows:

- Area 1: North of the village
- Area 2: West of the village (near the Rectory)
- Area 3: Central/ South of the village

A map detailing the following is shown in Appendix 2:

- 1% annual probability of flooding - Flood Zone 3 (previously referred to as 1 in 100 year flooding)
A plan showing the 2008 Environment Agency 1% probability Flood Zone, 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% annual probability flooding – Flood Zone 2 (previously referred to as 1 in 1,000 year flooding)
A plan showing the 2008 Environment Agency 0.1% probability Flood Zone, 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

The Environment Agency Flood Zone 1 is classified as 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. This is the remaining area which is not covered by Flood Zones 2, 3a and 3b.

5.2 Area 1 – North of the Village

One property in this area applied for Grant Aid from WODC. This property is located outside of the Environment Agency Flood Zone 1.

5.2.1 Overland Flow

The predominant flooding mechanism to the property in this area was from overland flow generated from the steeper areas to the northeast of the village. Due to the topography of the land, the property in this location is in a natural flow path to the Shill Brook and therefore created an obstruction to the flow, thus leading to flood water entering the property.

5.2.2 Shill Brook

The Shill Brook flows through this area and adjacent to (to the west of) the property. During the events in 2007, the Shill Brook rose and burst its banks which flooded the property in Area 1. It is believed that the flooding was partly caused by the culvert beneath the road causing a significant constriction to the flows within the watercourse. The flooding was exacerbated by the conveyance of the stream being reduced by the overgrown and silted nature of the channel.

5.3 Area 2 – West of the Village

Two properties in this area applied for Grant Aid from WODC. These properties are located outside of the Environment Agency Flood Zone 1.

5.3.1 Overland Flow

As with Area 1, the predominant flooding mechanism to the properties in this area was from overland flow. Overland flow generated from the steeper valley in this area caused flooding through the valley. This water then in turn breached the wall adjacent to the road, exacerbating the flooding on the road (see Section 5.4.1 below) as well as in the centre of the village.

5.3.2 Road Runoff and Highway Drainage

In July 2007, the road to the west of the village (adjacent to the Rectory and Manor Farm) experienced flooding that in turn contributed to the flooding in the centre of the village (i.e. that surcharged the road culvert). As mentioned in Section 5.3.1 above, some of the water from this road was sourced from the breached wall between the road and the Rectory area. In addition, the road drainage along this road is known to surcharge and cause some localised flooding on a much more regular occurrence than it did five or so years ago. During the site visit, inspection of the surface water drain revealed that in some locations, significant silting has occurred (up to approximately 200mm), which is contributing to this surcharging.

5.4 Area 3 – Centre and South of the Village

Three properties in this area applied for Grant Aid from WODC. These properties are located outside of the 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.

5.4.1 The Shill Brook

The Shill Brook flows through the centre of the village and during the flood events in 2007 burst its banks and flooded the properties adjacent to it. The culvert beneath the road was surcharged which in turn caused water to flow across the road and into the property to the south of the road. This surcharged water also caused damage to the road surface. It is believed that the flooding was partly caused by the culvert beneath the road causing a significant constriction to the flows within the watercourse. The flooding was exacerbated by the conveyance of the stream being reduced by the overgrown and silted nature of the channel. In addition, the flooding of the road to the west of the village (see Section 5.3.2 above) was believed to have exacerbated flooding in the village centre.

5.4.2 Road Runoff and Highway Drainage

As mentioned in Section 5.3.2 above the road to the west of the village (adjacent to the Rectory and Manor Farm) experienced flooding that in turn contributed to the flooding in the centre of the village (i.e. that surcharged the road culvert). As mentioned in Section 5.3.1 above, some of the water from this road was sourced from the breached wall between the road and the Rectory area. During the site visit, inspection of the surface water drain revealed that in some locations, significant silting has occurred (up to approximately 200mm), which is contributing to this surcharging.

5.4.3 Overland Flow

Due to the topography of the land, the properties in the northern extent of this area (i.e. in the centre of the village) is in a natural flow path to the Shill Brook and therefore created an obstruction to the flow, thus leading to flood water entering the property.

5.4.4 Groundwater

Westwell in general is susceptible to high groundwater levels relative to ground levels. As was the case in many areas across Oxfordshire and Gloucestershire, the events in July 2007 were preceded by prolonged heavy rain meaning that groundwater levels were generally high. As a result, not only were the impacts from overland flow exacerbated but some groundwater flooding was experienced by the properties in the centre and south of the village.

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 I. 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										
Westwell										
Version 1 – July 2008										
Option ref	Flood Overview	Description of work required					Key issues			Comments
		Options	Environment Agency	Oxfordshire County Council	Thames Water	WODC	Private	Effectiveness	Affects on adjacent land	
		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 – North of the village										
	Fluvial flooding from Shill Brook									
A	Ongoing maintenance of the Shill Brook	EA to be consulted for advice. Consent may be required.			WODC to provide co-ordination role	Riparian owners should continue to trim and clear vegetation from the channel and structures	Will increase channel capacity	Will help to contain flood waters for longer and reduce flooding of surrounding land	Up to £5,000	WODC undertook the initial clearance in October 2007. Riparian owners also undertook some clearing works in 2007.
	Overland Flow – During periods of high intensity or prolonged rainfall, overland flow from surrounding land flows into properties									
B	Install or upgrade land drainage ditches surrounding properties to the north and west of the village				WODC to undertake a co-ordination role	Riparian owners to dig ditches to intercept surface water runoff	Will aid in the reduction of surface water runoff entering properties	Care needed when installing to ensure no effect on diverting runoff to adjacent properties	Up to £5,000	Confirmation of ownership and responsibility required
C	Flood resilient measures to properties adjacent to the Shill Brook	EA website contains details and reference materials on flood resilient design			WODC to undertake a co-ordination role	Homeowners to provide protection against flooding to their properties e.g. flood boards, flood proofing, water resistant doors and entrances	Only effective if defences are put in place before the water level rises.	May increase flood risk to adjacent properties as flood water will be displaced	Up to £5k	

Option ref	Flood Overview	Description of work required					Key Issues			Comments
		Environment Agency	Oxfordshire County Council	Thames Water	WODC	Private	Effectiveness	Affects on adjacent land	Cost	
	Options	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 – West of the village										
	During high rainfall events the highway drains become surcharged									
D	Undertake blockage and siltation inspections of road drains especially along road to the west of the village. Undertake regular maintenance (e.g. clearing or jetting) measures		OCC to organise inspection and maintenance		WODC to undertake a co-ordination role		This could improve drainage during high intensity rainfall events		Up to £5k	
E	Replace wall between Rectory and the road to the west of the village with a flood resilient wall to ensure no breaching occurs that could overwhelm drainage system				WODC to undertake a co-ordination role and to confirm responsibility		Could aid in reducing the occurrence of a breach in the wall and therefore overwhelming of highway drainage		Approx £5k to £10k	Confirmation of ownership and responsibility required
	Overland Flow – During periods of high intensity or prolonged rainfall, overland flow from surrounding land flows into properties									
B	Install or upgrade land drainage ditches surrounding properties to the north and west of the village				WODC to undertake a co-ordination role	Riparian owners to dig ditches to intercept surface water runoff	Will aid in the reduction of surface water runoff entering properties	Care needed when installing to ensure no effect on diverting runoff to adjacent properties	Up to £5,000	Would require confirmation with residents/ landowners

Option ref	Flood Overview	Description of work required					Key Issues			Comments
		Options	Environment Agency	Oxfordshire County Council	Thames Water	WODC	Private	Effectiveness	Affects on adjacent land	
		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 – South and centre of the village										
	Fluvial Flooding from Shill Brook									
A	Ongoing maintenance of the Shill Brook	EA to be consulted for advice. Consent may be required.			WODC to carry out future clearing and provide co-ordination role	Riparian owners should continue to trim and clear vegetation from the channel and structures	Will increase channel capacity	Will help to contain flood waters for longer and reduce flooding of surrounding land	Up to £5,000	WODC undertook the initial clearance in October 2007. Riparian owners also undertook some clearing works in 2007.
B	Flood resilient measures to properties adjacent to the Shill Brook	EA website contains details and reference materials on flood resilient design			WODC to undertake a co-ordination role	Homeowners to provide protection against flooding to their properties e.g. flood boards, flood proofing, water resistant doors and entrances	Only effective if defences are put in place before the water level rises.	May increase flood risk to adjacent properties as flood water will be displaced	Up to £5k to £20k	
C	Install measures to ensure surcharged water from the culvert beneath the road is directed along road and property driveway, back into the stream rather than into properties		Potentially install devices in the road e.g. speed humps to direct flow		WODC to undertake a co-ordination role	Relevant property owners to install measures to ensure floodwater is directed along driveways	Will ensure any surcharging water is directed along the road/driveway rather than into properties	Will help to direct water away from properties	Approx £5,000 - £20,000	Would require confirmation with residents

Option ref	Flood Overview	Description of work required					Key Issues			Comments
		Environment Agency	Oxfordshire County Council	Thames Water	WODC	Private	Effectiveness	Affects on adjacent land	Cost	
	Options	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 – South and centre of the village...continued										
	During high rainfall events the highway drains become surcharged									
D	Undertake blockage and siltation inspections of road drains especially along road to the west of the village. Undertake regular maintenance (e.g. clearing or jetting) measures		OCC to organise inspection and maintenance		WODC to undertake a co-ordination role		This could improve drainage during high intensity rainfall events		Up to £5k PA	
E	Replace wall between Rectory and the road to the west of the village with a flood resilient wall to ensure no breaching occurs that could overwhelm drainage system				WODC to undertake a co-ordination role and to confirm responsibility		Could aid in reducing the occurrence of a breach in the wall and therefore overwhelming of highway drainage		£5k to £10k	Confirmation of ownership and responsibility required
	Overland Flow – During periods of high intensity or prolonged rainfall, overland flow from surrounding land flows into properties									
F	Dredging and maintenance of the village pond				WODC to undertake a co-ordination role and to confirm ownership and responsibility of the pond		Will increase the capacity of the pond and store more water sourced from the Rectory area	None	Up to £5,000	Some residents already undertake clearing of the pond

7.0 CONCLUSIONS AND RECOMMENDATIONS

7.1 Area 1 – North of the village

The main flooding problem to this area was from overland flow and the Shill Brook.

7.1.1 Maintenance

The Shill Brook is a non-main river (an Ordinary Watercourse) and therefore not within of the jurisdiction of the Environment Agency. During the site visit, it appeared to be fairly clear for much of its course, partly as a result of the clearing works undertaken in October 2007 by WODC and local residents. However, some areas of the watercourse and the structures were overgrown or silted.

As a result of these, it is recommended that the following maintenance measures be undertaken:

- Option A: The Shill Brook is an Ordinary Watercourse river and therefore the responsibility of the riparian owners and WODC to undertake regular maintenance

7.1.1 Flood defence improvement schemes

The following flood defence improvement schemes are recommended:

Immediate (under 1 year)

- Option B: Flood resilient measures to affected properties

Mid-Term (under 1 -2 years)

- Option G: Install land drains or ditches to help divert overland flow away from properties

7.2 Area 2 – West of the village

The main flooding problem to this area was from overland flow and surcharged drainage.

7.2.1 Maintenance

During the site visit, the highway drain to the west of the town was observed to be silted and therefore possibly operating at a reduced capacity. Therefore the following ongoing maintenance is recommended:

- Option E: OCC to undertake regular and ongoing maintenance of the highway drains.

7.2.2 Flood defence improvement schemes

The following flood defence improvement schemes are recommended:

Immediate (under 1 year)

- Option B: Flood resilient measures to affected properties

Mid-Term (under 1 -2 years)

- Option F: Replace wall adjacent to Rectory and the road
- Option G: Install land drains or ditches to help divert overland flow away from properties

7.3 Area 3 – South and centre of the village

The main flooding problem to this area was from the Shill Brook, overland flow, groundwater and surcharged surface water drainage.

7.1.1 Maintenance

The Shill Brook is a non-main river (an Ordinary Watercourse) and therefore not within of the jurisdiction of the Environment Agency. During the site visit, it appeared to be fairly clear for much of its course, partly as a result of the clearing works undertaken in October 2007. However, some areas of the watercourse and the structures were overgrown or silted.

During the site visit, the highway drain to the west of the town was observed to be silted and therefore possibly operating at a reduced capacity. Therefore the following ongoing maintenance is recommended:

As a result of these, it is recommended that the following maintenance measures be undertaken:

- Option A: The Shill Brook is an Ordinary Watercourse river and therefore the responsibility of the riparian owners and WODC to undertake regular maintenance
- Option C: Dredge and maintain the village pond, can use the dredged material to build up the banks and therefore provide greater capacity
- Option E: OCC to undertake regular and ongoing maintenance of the highway drains.

7.1.1 Flood defence improvement schemes

The following flood defence improvement schemes are recommended:

Immediate (under 1 year)

- Option B: Flood resilient measures to affected properties

Mid-Term (under 1 -2 years)

- Option F: Replace wall adjacent to Rectory and the road

Long-Term (3 years or more)

- Option D: Install measures to ensure surcharged water from the road culvert is directed along the roads and driveways rather than properties.
- Option C: Dredge and maintain village pond, can use the dredged material to build up banks and thus provide greater capacity.

Appendix I: Photographs

Appendix 1a – Photographs of the flood event in 2007

Plate 1 Flooding of the Shill Brook and properties (left of picture) at Area 3, looking south (downstream)



Plate 2 Flooding on the road in the village centre (Area 3), flowing into private driveway, looking southeast



Plate 3 Flooded stream and properties in village centre (Area 3), looking north (upstream)



Plate 4 Surcharging culvert adjacent to properties in northern extent of village, looking upstream (Area 1)



Plate 5 Flooding in the valley fields to the west of the village, near the Rectory (Area 2)



Plate 6 Flooded road from breach in wall, Manor Farm to the right (Area 2). Looking east, towards village centre



Plate 7 Breach in wall between road and the Rectory (Area 2)



Appendix 1b – Photographs taken during site walkover in 2008

Plate 8 Example of silted highway drain beneath road adjacent to Manor Farm (Area 2)



Plate 9 Existing watercourse looking upstream towards properties at northern extent of village (Area 1)



Plate 10 Entrance to culvert beneath driveway to properties to the north of the road (Area 3)



Plate 11 Shill Brook between driveway and road, looking downstream (Area 3)



Plate 12 Village pond, looking north from the road. This shows works already undertaken including dredging and bank raising (Area 3)



Plate 13 Example of cleared extent of stream, downstream of culvert beneath road (Area 3), looking south (downstream)



Plate 14 Stream north (upstream) of village, looking north (Area I)



Plate 15 Upstream extent of watercourse, looking north (Area I)

