



WEST OXFORDSHIRE  
DISTRICT COUNCIL

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# Parish Flood Report: South Leigh

August 2008



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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<sup>1</sup> 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<sup>2</sup> land owner, and permissive powers<sup>1</sup> 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.

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<sup>1</sup> 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

<sup>2</sup> 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

### Flood Grants

- WODC Flood Grants totalling £500.00 given out.

### Reports

- WODC Parish Flood Report for South Leigh completed in August 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 the Emergency Plan recognises the role the elected members can play in emergency and recovery situations
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 early in 2008 to progress this
Progress the Strategic Flood Risk Assessment
Consider producing a revised warning system that identifies a higher category of risk that is only issued in exceptional circumstances
Approaches to be made to the EA and Metrological Office with regard to improving their predictive capability
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
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

#### 3.1 General

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 the Parish of South Leigh and has been prepared by the Council's Engineering team. It pulls together information from external agencies and individual property owners. It identifies the causes of flooding in South Leigh during July 2007 and potential mitigating solutions.

The report itself is broken down into a number of sections and will include;

- An overview of flooding history in South Leigh and flood related issues raised by residents
- A presentation of the problems and causes of flooding in South Leigh during July 2007.
- A summary of all the flooding issues and potential mitigation options.
- A breakdown of the recommendations for immediate, mid-term and long term actions including the responsibly agency based on the options identified.

The table below provides a summary of some of the main causes of the flooding in South Leigh and the mitigation options that could be applied to alleviate the different flooding problems. More detail is provided regarding the specific locations and the causes of flooding in section 5 of the report.

Source of flooding	Potential mitigation measures
Land and highway drainage system capacity overloaded by run-off from fields surrounding the village of South Leigh	Provide upstream attenuation or balancing ponds
Blockages in the field boundary cut-off ditches adjacent to the highway	Clear/ maintain field drainage ditches
Blocked culverts in land drainage adjacent to the highway	Clear and maintain culverts or piped watercourses on a regular basis.
Sharp changes in direction or 'pinch points' in the drainage system increase risk of overflows	Divert culverts/ open watercourses away from properties within the village.
Surcharging of Limb Brook	Bed re-profiling or re-routing of Limb Brook

## **3.2 SURVEY**

### **3.2.1 Description of area**

The Parish of South Leigh is approximately 1622 Hectares (4008 acres) in size.

The village of South Leigh is situated to the south-east of Witney, and South of the A40, Witney by-pass. It is accessed by a minor trunk road, the B4022, South Leigh Road, which runs in a mainly north-west to south-east direction from the A40 for 2 miles through open countryside bounded on both sides by high hedgerows. After approximately two miles, South Leigh Road becomes Chapel Road.

Dwellings are widely spaced with detached single cottages and small groups of three to six or more cottages in blocks mainly situated to the southern side of Chapel Road the northern side being cultivated private agricultural land. The road continues for approximately a mile to a t-junction, known as Margery Cross. Here, the main carriageway becomes Station Road and bears south towards Stanton Harcourt. Dwellings in Station Road are widely spaced along both sides of the carriageway. The left turn at Margery Cross, Church End, is a short and narrow, no-through road rising to the north-east and terminating in the small Church End housing estate at the highest point with the cemetery and St. James' Church.

Station Road lies fairly flat beyond a Public House for a half mile falling gently to a junction with a sharp right hand bend at the old level crossing. The road at the old level crossing is barreled, highlighting the position of the dismantled railway line and railway embankment and falls sharply down from this point to dwellings on Stanton Harcourt Road. The road bears sharp right at these dwellings and rises away from the village in a south-easterly direction alongside Tar Wood a woodland area to the south of the village.

### **3.2.2 Survey approach**

Visual walk-over surveys have been undertaken. Photographs of some of the flood affected areas are in Appendix 1.

A review of all correspondence, received by the Council about the July 2007 flooding in the Parish of South Leigh has been carried out and incorporated within the findings of the report.



### 3.2.3 Meetings

Details of key meetings attended by District Council representatives about the flooding of South Leigh in July 2007 are given in Table below;

<b>Date</b>	<b>Main participants and Venue</b>	<b>Description</b>
28/06/07	Meeting at Chapel Road between Laurence King and resident	Site inspection regarding land drainage
10/09/07	Site Meeting at South Leigh between Laurence King, Principal Engineer WODC and local Parish Councillors and residents	Discussed responsibilities for ditch clearance and agreed actions to approach a local farmer, OCC and Eynsham Estate Managers regarding their responsibilities
25/09/07	Meeting between Laurence King, Principal Engineer WODC and OCC, Gordon Hunt and Wayne Barker	Agreement to jet and survey culverts and pipe systems, also clean out grips by end of October 2007
05/12/07	Site meeting at Margery Cross between Savills(L&P) Limited, Chartered Surveyors and Laurence King, Principal Engineer WODC	Discussions related to maintenance of vegetation and ditches belonging to Eynsham Park Estate, agreements on maintenance reached.
03/01/08	Site meeting at Chapel Road, South Leigh between Laurence King and residents	Site inspection regarding land drainage problems
22/07/08	Meeting and site visit by Jeff Mason, Consultant Engineer with John Ashwell, Clerk to South Leigh Parish Council and residents affected by flooding	Discussions regarding locations and causes of flooding

The District Council has liaised with the Environment Agency, Oxfordshire County Council and Thames Water. The Environment Agency has carried out visual surveys of the flooded areas affected by the main river.

The District Council has contacted some of the owners of properties that flooded in July 2007.

### 3.2.4 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

To date the owners of 2 residential properties in the Parishes of South Leigh have received Emergency Flood Relief Grant Aid, however it is acknowledged that this is not the total number of properties affected 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.

### **3.2.5 Flooding History**

Discussions with local residents have indicated that some South Leigh properties have been flooded on around 3 occasions in the last 2 years, in the winter of 2006/07, during the July 2007 event and in October 2007.

## 4.0 PROBLEMS AND CAUSES

### 4.1 Plans

Appendix 2 contains two maps showing:

Figure 1- a map showing areas in South Leigh where flooding occurred in July 2007.

Figure 2 – a single map showing;

- **Environment Agency** - main rivers and enmained water courses in the area.
- **Flood Zone 2, January 2008** - 0.1% annual probability of flooding occurring or low to medium risk. Previously referred to as 1:1,000 year flooding.
- **Flood Zone 3, January 2008** - 1% annual probability of flooding occurring or high risk. Previously referred to as 1:100 year flooding

**Note** – this EA map has been updated to reflect the events of July 2007.

### 4.2 Causes of Flooding

Flooding in the village is caused by agricultural runoff overwhelming the existing land and highway drainage systems. These systems are comprised of a network of ditches, swales and piped sections which follow field and road boundary hedgerows and tend to flow into the main ordinary watercourse, the Limb Brook.

The catchment area for the Limb Brook is extensive and during intense rainfall can generate large volumes of water which can overload the Limb Brook and the network of ditches feeding it causing overflows across highways and through private dwellings. The overflows normally occur at various 'pinch points' where there are sharp changes in direction of flow coupled with culverted reaches beneath the highway or other structures such as houses or field accesses. Overflows also occur along the highway where field boundary cut-off ditches adjacent to the highway become overloaded due either to lack of capacity or an obstruction to flow such as debris or short, piped sections which can become easily blocked. Overflows which cause severe flooding to properties occur in three or four main areas. Each of these areas has a unique set of conditions which make it susceptible to flooding. All of these locations are low lying, hydraulically speaking compared to the main overland flows. All of these locations are in close proximity to main receptors at pinch points, these receptors being field drainage ditches or the Limb Brook.

### 4.3 Area 1 – South Leigh Road / Chapel Road

Over-ground flows from the direction of properties to the south of South Leigh Road / Chapel and the fields to the north-east of the properties enter cut-off ditches at the field boundaries, these ditches are not well defined in some places and in extreme rainfall conditions runoff from the fields exceeds the capacity of the ditches and flows towards and into the properties situated down hill of the ditches. Flows then tend towards the Limb Brook which crosses the highway in a natural depression at the properties on South Leigh Road / Chapel Road. The Limb Brook flowing through the highway culvert can exceed the capacity of this structure due to the size of the catchment attached to the Limb Brook and the quantity of water entering the watercourse at this point and in extreme rainfall conditions can cause the Brook to rise above the highway and into nearby dwellings.

The cause of flooding is the following:

#### **4.3.1 Run-off from the fields exceeds the capacity of the ditches**

Ditches at field boundaries are not well defined and during heavy rainfall, run-off from the fields can exceed the capacity of the ditches, causing localised flooding.

#### **4.3.2 Highway culvert capacity exceeded by Limb Brook**

During extreme rain events the Limb Brook flow can exceed the capacity of the highway culvert.

### **4.4 Area 2 – Chapel Road**

Over-ground field flows from the private agricultural areas to the north of the highway surcharge the piped culverts below the highway opposite the properties to the eastern end of Chapel Road. Surcharging is sufficient in some flood conditions to force the lid off the manhole cover situated over this culvert in the owner's property boundary. The ditch eventually overflows into the highway and the flood water naturally tends towards the Limb Brook located to the rear and downhill of these properties. The properties are at a lower level than the ditch and form a barrier to the flood flows from it. In exceptionally high rainfall conditions flows can enter the properties causing damage.

#### **4.4.1 Run-off from the fields exceeds the capacity of the piped culverts**

Run-off from fields is sufficient in times of heavy rainfall to surcharge the drainage systems in the highway.

#### **4.4.2 Highway run-off flowing towards the Limb Brook**

Excess highway run-off flows down natural landform towards the Limb Brook. The properties along Chapel Road are in the path of this natural flow, resulting in flooding to property in extreme conditions.

### **4.5 Area 3 – Margery Cross**

Surcharging of the Limb Brook occurs at the twin, brick arch culvert due to shallow falls in this watercourse and a sharp right hand deviation in the brook immediately downstream of the culvert and causes the water levels in the brook to rise and flow onto the highway. This flow combined with over-ground flows from Church End causes water levels in the highway to reach over a metre in depth engulfing the Public House and making the highway impassable to all but the most robust traffic.

#### **4.5.1 Low capacity of brick arch culvert**

The capacity of the brick arch culvert is insufficient during extreme rainfall to cope with the flow of water arriving there from the Limb Brook.

#### **4.5.2 Sharp deviation of Limb Brook**

A right hand dog-leg deviation in the Limb Brook downstream of the brick arch culvert slows the flow of the water which eventually surcharges over the highway.

### **4.6 Area 4 – Stanton Harcourt Road**

Overground flows from fields to the west of these properties culminate at restrictive piped culverts beneath Stanton Harcourt Road and the railway embankment. Ditches entering and in the grounds of properties to the south-west of Stanton Harcourt Road accept flows from the field catchment to the west and the highway. Once the ditches become overloaded, they flood back across the road through the properties to the north-east of Stanton Harcourt Road.

Depths of 30 to 45cm in the highway have been observed. This is a natural low point with the railway embankment to the north preventing the flood waters entering the Limb Brook directly and resulting in damage to properties to the north-east of Stanton Harcourt Road.

#### **4.6.1 Run-off from the fields exceeds the capacity of the piped culverts**

Run-off from fields is sufficient in times of heavy rainfall to surcharge the drainage systems in the highway.

#### **4.6.2 Run-off from the fields exceeds the capacity of the ditches**

Ditches receiving over-ground run-off surcharge in extreme rainfall events and flood back across the highway.

#### **4.6.3 Railway embankment prevents water from flowing into the Limb Brook**

The railway embankment to the north of Stanton Harcourt Road properties forms a barrier to the flow of flood water into the Limb Brook.

## 5.0 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.

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 (6.0).

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.

<b>Area</b>		<b>1</b>		<b>2</b>	
<b>Flooded Properties &amp; Causes</b>		Affected properties are on South Leigh Road / Chapel Road  Primary causes (i) Run-off from the fields exceeds the capacity of the ditches (ii) Highway culvert capacity exceeded by Limb Brook		Affected properties along Chapel Road  Primary causes (i) Run-off from the fields exceeds the capacity of the piped culverts (ii) Highway run-off towards the Limb Brook	
<b>Options</b>		<b>1</b>		<b>2</b>	
<b>Description of options</b>		Provide balancing ponds to prevent flooding by attenuating the flow of flood water before it reaches the properties on South Leigh Road / Chapel Road	Upgrade highway culvert and localised ditching improvements	Upgrading culverts under Chapel Road and fitting of flap valves to gullies	New outfall into the Limb Brook to rear of Chapel Road properties
<b>Responsible Agencies</b>	<b>EA</b> For queries Tel: 08708 506506	EA participation and consents required	EA participation and consents required		EA participation and consents required
	<b>OCC</b> For queries Tel: 08453 101111		Work would need to be initiated by OCC as highway would be affected	Work would need to be initiated by OCC as highway would be affected	
	<b>Thames Water</b> For queries Tel: 08459 200800				
	<b>WODC</b> For queries Tel: 01993 861000	WODC to co-ordinate work for this proposal, agreement needed on who would fund feasibility study and design	WODC to co-ordinate work for this proposal	WODC to co-ordinate work for this proposal	WODC to co-ordinate work for this proposal, agreement needed regarding funding of this proposal
	<b>Private/Other Organisations</b>	Private landowners agreement required to carry out work and maintain in perpetuity	Private landowners to undertake ditching improvements on their land		Private landowners agreement required to carry out work and maintain in perpetuity
<b>Effectiveness/ Effects on adjacent land</b>		Provides 1 in 100 year flood protection. Requires land to the north-east of properties	Upgrading of the culvert beneath the highway alone may not solve flooding at this point	Prevents flooding of Chapel Road properties in moderate events, calculations would need to be carried out to confirm effectiveness against extreme events	Assists the flow of flood water into Limb Brook from Chapel Road direction, may help prevent flooding of Chapel Road properties
<b>Cost</b>		£20k to £50k	£5k to £20k	£5k to £20k	£5k to £20k

<b>Area</b>		<b>3</b>		<b>4</b>	
<b>Flooded Properties &amp; Causes</b>		Affected properties and road around Margery Cross.  Primary causes (i) Low capacity of brick arch culvert (ii) Sharp deviation of Limb Brook		Affected properties along Stanton Harcourt Road  Primary causes (i) Run-off from fields exceeds piped culverts (ii) Run-off from fields exceeds capacity of the ditches (iii) Railway embankment prevents flood water from flowing into the Limb Brook	
<b>Options</b>		<b>1</b>	<b>2</b>	<b>1</b>	<b>2</b>
<b>Description of options</b>		Upgrade culverts under the highway at Margery Cross	Limb Brook bed re-profiling and re-routing	Provide balancing ponds to prevent flooding by attenuating the flow of flood water before it reaches the properties on Stanton Harcourt Road	Upgrading and forming new culverts under Stanton Harcourt Road through adjacent private property and the railway embankment to an open channel to discharge into the Limb Brook
<b>Responsible Agencies</b>	<b>EA</b> For queries Tel: 08708 506506		EA participation and consents required	EA participation and consents required	EA participation and consents required
	<b>OCC</b> For queries Tel: 08453 101111	Work would need to be initiated by OCC as highway would be affected			Work would need to be initiated by OCC as highway would be affected
	<b>Thames Water</b> For queries Tel: 08459 200800				
	<b>WODC</b> For queries Tel: 01993 861000	WODC to co-ordinate work for this proposal	WODC to co-ordinate work for this proposal, agreement needed regarding funding of this proposal	WODC to co-ordinate work for this proposal, agreement needed on who would fund feasibility study and design	WODC to co-ordinate work for this proposal, agreement needed regarding funding of this proposal
	<b>Private/Other Organisations</b>			Private landowners agreement required to carry out work and maintain in perpetuity	Private landowners agreement required to carry out work and for them to maintain in perpetuity
<b>Effectiveness/ Effects on adjacent land</b>		Prevents flooding of the road and properties in moderate events, calculations would need to be carried out to confirm effectiveness against extreme events	Will prevent localised flooding around Limb Brook deviation	Provides 1 in 100 year flood protection. Requires land to the west or south west of the affected properties	Prevents flooding of the road and properties in moderate events, calculations would need to be carried out to confirm effectiveness against extreme events
<b>Cost</b>		£5k to £20k	£5k to £20k	£20k to £50k	£5k to £20k



## 6.0 CONCLUSIONS AND RECOMMENDATIONS

Due to the size of the catchment for the Limb Brook it is probably more realistic and cost effective to consider remediation by means of attenuation, catchment by catchment rather than by providing solutions to individual flood occurrences. It is necessary to carry out an in-depth catchment study of the Limb Brook watercourse from its source to the outfall into the River Thames in order to achieve this. Many of the storage structures required to achieve this attenuation may already be in existence but may either have been abandoned, neglected or destroyed by changing agricultural processes and lack of understanding of their nature and purpose over the last few decades. However, by identifying their locations it is quite possible to reintroduce these structures or form similar new structures to achieve control of flows into populated areas. This project would require the land owners and the Environment Agency's participation and consents as well as ongoing monitoring and maintenance in perpetuity.

Instant 'fixes' may be accomplished by means of upgrading existing drainage apparatus and enforcement of ditch clearances on an annual basis. Culverting under highways and properties is expensive and will still require an amount of desktop calculation. Flows into this apparatus will still be largely uncontrolled and the chances of blockages causing flooding will still exist. Nevertheless, this option does not necessarily require the consent or co-operation of land owners and will likely be carried out on a programme of works initiated by the local highway authority, Oxfordshire County Council. These works will create disruption to traffic and property owners throughout the duration of their implementation.

### 6.1 Area 1 – South Leigh Road / Chapel Road

#### 6.1.1 Maintenance

The following ongoing maintenance is recommended:

- Reinstatement of ill-defined ditches and maintenance of all ditches along field boundaries, particularly those uphill of the properties on South Leigh Road / Chapel Road by private landowners.
- Ongoing maintenance required to the culvert beneath the highway along South Leigh Road / Chapel Road

#### 6.1.2 Flood Defence Improvement Schemes

The following flood defence improvement schemes are recommended:

##### Mid-Term (under 1-2 years)

- Action 2 - Upgrade highway culvert and localised ditching improvements

##### Long-Term (3 years or more)

- Action 1 - Provide balancing ponds to prevent flooding by attenuating the flow of flood water before it reaches the properties on South Leigh Road / Chapel Road.

### 6.2 Area 2 – Chapel Road

#### 6.2.1 Maintenance

The following ongoing maintenance is recommended:

- Ongoing maintenance of all ditches along field boundaries, particularly those uphill of properties on Chapel Road by private landowners.
- Ongoing maintenance required to the piped culvert beneath the highway along Chapel Road

## **6.2.2 Flood Defence Improvement Schemes**

The following flood defence improvement schemes are recommended:

### Mid-Term (under 1-2 years)

- Action 1 - Upgrading culverts under Chapel Road

### Long-Term (3 years or more)

- Action 2 - New outfall into the Limb Brook to rear of Chapel Road properties

## **6.3 Area 3 – Margery Cross**

### **6.3.1 Maintenance**

The following ongoing maintenance is recommended:

- Ongoing maintenance of all ditches along field boundaries, particularly those around Margery Cross by private landowners.
- Ongoing maintenance required to the brick arch culvert beneath the highway at Margery Cross.

### **6.3.2 Flood Defence Improvement Schemes**

The following flood defence improvement schemes are recommended:

#### Mid-Term (under 1-2 years)

- Action 1 - Upgrade culverts under the highway at Margery Cross

#### Long-Term (3 years or more)

- Action 2 - Limb Brook bed re-profiling and re-routing

## **6.4 Area 4 – Stanton Harcourt Road**

### **6.4.1 Maintenance**

The following ongoing maintenance is recommended:

- Ongoing maintenance of all ditches along field boundaries, particularly those uphill of properties on Stanton Harcourt Road by private landowners.
- Ongoing maintenance required to the piped culvert beneath the highway along Stanton Harcourt Road.

### **6.4.2 Flood Defence Improvement Schemes**

The following flood defence improvement schemes are recommended:

#### Long-Term (3 years or more)

- Action 2 - Upgrading and forming new culverts under Stanton Harcourt Road through adjacent private property and the railway embankment to an open channel to discharge into the Limb Brook.
- Action 1 - Provide balancing ponds to prevent flooding by attenuating the flow of flood water before it reaches the properties on Stanton Harcourt Road.

## Appendix 1: Photographs



Area 1 – Culvert under South Leigh Road



Area 1 – Badly defined ditch off South Leigh Road



Area 1 – Culvert at Limb Brook



Area 2- Flooding at Chapel Road junction



Area 2 – Cut-off drained installed at Chapel Road



Area 2 – Culverts cross under Chapel Road at this point



Area 3 – Brick arch culvert at Margery Cross



Area 3- Flooding at Margery Cross



Area 3 – Culverts cross under road at this point



Area 4 - Culvert at Stanton Harcourt Road



Area 4- Ditches in private property off Stanton Harcourt Road



Area 4- Ditch at Stanton Harcourt Road